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Internal Market and Consumer Protection

# Energy Efficiency for Low-Income Households

**Study for the ITRE Committee**

EN

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DIRECTORATE GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

# Energy Efficiency for Low-Income Households

STUDY

**Abstract**

This study analyses the impacts that energy efficiency has on low-income households; to what degree energy efficiency policies should specifically target low-income households; and in which circumstances they should be combined with social policies addressing energy consumption in low-income households. The study aims to support a balanced debate on policy options to fight energy poverty, in particular in the context of the revision of the Energy Efficiency Directive (EED) and the Energy Performance of Buildings Directive (EPBD). This study was prepared by Policy Department A at the request of the Committee on Industry, Research and Energy Committee (ITRE).

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**DISCLAIMER**

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# LIST OF ABBREVIATIONS

| | |
|---|---|
| **ACEEE** | American Council for an Energy Efficient Economy |
| **AF** | Affordable Warmth |
| **CFL** | Compact fluorescent lamp |
| **CSCO** | Carbon saving communities obligation |
| **DECC** | (UK) Department of Energy and Climate Change |
| **DOE** | (US) Department of Energy |
| **ECEEE** | European Council for an Energy Efficient Economy |
| **ECO** | Energy company obligation |
| **EE** | Energy efficiency |
| **EEA** | European Environmental Agency |
| **EED** | Energy Efficiency Directive |
| **EEO** | Energy Efficiency Obligation |
| **EMF** | European Mortgage Fund |
| **EP** | European Parliament |
| **EPBD** | Energy Performance of Buildings Directive |
| **ESCO** | Energy Service Company |
| **EFSI** | European Fund for Strategic Investments |
| **ERDF** | European Regional Development Fund |
| **ESF** | European Social Fund |
| **EU** | European Union |
| **EU-ETS** | EU Emissions Trading System |
| **EU-SILC** | EU Statistics on income and living conditions |
| **GDP** | Gross Domestic Product |

| | |
|---|---|
| **GESB** | Global Environmental Social Business |
| **GHG** | Greenhouse gases |
| **IEA** | International Energy Agency |
| **ITRE** | (European Parliament's Committee on) Industry, Research and Energy |
| **LED** | Light-emitting diode |
| **LIHEAP** | (US) Low Income Home Energy Assistance Programme |
| **MS** | Member State |
| **MSR** | Market Stability Reserve |
| **MURE** | Mesures d'Utilisation Rationnelle de l'Energie |
| **NEEAP** | National Energy Efficiency Action Plan |
| **OFGEM** | (UK) Office of Gas and Electricity Markets |
| **RES** | Renewable energy sources |
| **WAP** | (US) Weatherization Assistance Programme |

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# EXECUTIVE SUMMARY

This study aims at analysing **the impacts that energy efficiency has on low-income households**, at determining to what degree energy efficiency policies should **specifically target low-income households**, and in which circumstances they should be **combined with social policies** addressing energy consumption in low-income households. The study was commissioned in the context of the revision of the Energy Efficiency Directive (EED) and the Energy Performance of Buildings Directive (EPBD).

The study starts by classifying and analysing **the multiple impacts** that energy efficiency has on low-income households (classified as environmental, economic and social). This analysis informs the reader of the need for establishing policies that deliver all those identified multiple benefits. Then the study continues with the analysis of **barriers** to energy efficiency in low-income households (classified in four types: behavioural, informational, economic and administrative). Those barriers that are most relevant for low-income households are analysed in detail. Afterwards the study proceeds with a **thorough assessment of those policies** that can contribute to remove these barriers and/or contribute to deliver the multiple benefits of energy efficiency.

**Three policy groups** are identified with regards to achieving the multiple benefits of energy efficiency in low-income households:

- General energy efficiency policies for households;
- Energy efficiency policies addressing low-income households either by a specific component or by specifically targeting this group;
- Social policies addressing energy consumption in low-income households.

All identified policies are described and analysed in relation to their capacity **to overcome the identified barriers and deliver the multiple benefits** of energy efficiency, in particular the reduction of energy poverty. The factors that affect the choice of policies are also assessed and **several examples of existing policies in EU Member States and abroad** are presented. The study continues with a **comparative analysis of the three groups of policies** to understand their capacity to remove barriers and how they contribute to achieve energy efficiency and deliver its multiple benefits. Finally, the study culminates with the elaboration of a **set of policy recommendations** to improve energy efficiency in low-income households.

This report is based on three types of data source: **scientific literature** and **technical reports**, **databases** of energy efficiency policies, and **stakeholder interviews**.

The **EU policy framework** considers the need for energy efficiency policies combined with social policies addressing energy consumption in low-income households to fight energy poverty. But it does not prescribe how these measures should be integrated into specific **EU and Member State regulations**, or how to ensure that all households are reached. Finding the right balance between energy efficiency and social policies is the challenge to combating energy poverty effectively. **Energy efficiency policies** aim at structural improvements and take time to have effects. **Social policies** offer the rapid alleviation of energy poverty effects, but do not remove barriers to energy efficiency. Social policies, such as tolerance for non-payment of energy bills, direct payments, reduced tariffs and social security payments are present in almost every Member State, while energy efficiency policies for households are not implemented to the same extent.

Most of the **general energy efficiency policies** have positive environmental and economic impacts, but they are neutral or partly negative with regards to social impacts, because they do not address specific barriers affecting low-income households. **Energy efficiency policies specifically targeting low-income** households have positive social impacts and

are able to deliver the multiple benefits of energy efficiency. However, there are only a limited number of such policies in EU Member States. Among those, **energy audits** combined with **financial instruments** consisting of loans and grants for building renovations are the most successful measures. Energy audits and **dedicated information campaigns** build on a better understanding of improvement opportunities, their benefits and costs. They raise awareness on energy efficiency and inform household residents of potential economic savings in their energy bills. The Caritas Strompspar check in Germany is the best identified example for energy audits and informational campaigns. The Sanierungs Check in Austria, the Habiter Mieux in France, the Better Homes Schemes in Ireland, the Home energy efficiency programmes in Scotland, the Weatherization Assistance Program (WAP) in the USA and the New Zealand Warmer Homes are **best-case examples** targeting extensive thermal refurbishment in low-income households. All these programmes have in common that they provide grants earmarked for measures such as wall and roofs insulation and boiler replacements. Multiple benefits, such as higher comfort levels and recognisable health benefits, are rapidly recognised by beneficiaries of these programmes.

None of the researched policies sufficiently addresses the **split-incentives barrier**, other than by providing a direct subsidy. Policy approaches to deal with this barrier could include investment models with longer payback time, or by requiring that all rental dwellings comply with a minimum energy performance to avoid the landlord-tenant dilemma before it occurs.

## Recommended policy options

Six overall recommendations, each with specific suggestions are proposed in this study.

1. **Define broad common definitions of energy poverty and vulnerable consumers at EU level to facilitate the design of effective energy efficiency policies and facilitate their monitoring, but leave the Member States the ability to further refine these definitions to take into consideration their specific country or regional differences:** A common definition may help standardise policy and increase political visibility, but also runs the risk of erasing social demographic and regional complexities. Despite the risks, a common definition of terminology and more information on the results and impacts of energy efficiency programmes would not only support the design of individual policies, but also help to understand which best-practice examples could be applied to other Member States and target groups. The suggestion is to include these definitions in the EED and EPBD, but leaving the Member States the ability to further refine them to take into consideration country or regional differences.
2. **The challenging European long-term targets on energy saving in the buildings require that all types of end-users are addressed, including vulnerable households. Active monitoring should reveal whether this is achieved in each Member State:** The EU and Member States' policy framework must ensure that energy efficiency targets and measures address all groups equally, including vulnerable groups that are more difficult to reach such as low-income households. The suggestion is to include reporting requirements in the EED and EPBD addressing all end-users and specifying barriers that hamper policies reaching low-income households. A more stringent addition to the EED is that Member States are required to include sub-targets for vulnerable households in their energy efficiency obligation targets. The EPBD could increase requirements in the implementation of minimum energy performance.
3. **Design energy efficiency policies in such a way that they support additional (social or economic) benefits and limit rebound and counterproductive effects:** Energy efficiency policies may generate rebound effects: savings on energy bills can be used to purchase additional appliances, or heat more rooms in the house. However, despite these negative rebound effects on energy consumption, there are other positive effects such as better health and well-being, and improved property values that by

themselves are important reasons for implementing specific energy efficiency policies for low-income households. It is suggested that the EED, the EPBD and the Labelling Directive make the Commission request that Member States take the multiple benefits of energy efficiency into account in training and education to mitigate counterproductive effects. Member States can pro-actively communicate the multi-benefits of energy efficiency to their citizens, and finally, the European Commission could engage Member States to actively share the lessons learned about rebound effects to help other Member States in designing effective policies.

4. **In situations where energy efficiency improvements have difficulties reaching certain end-users, the policy framework needs to integrate measures that address specific barriers or monitoring requirements for these end-users:** Low-income households are more prone to energy poverty because they are affected by persistent barriers to energy efficiency, in particular the split-incentives barrier (landlord/tenant dilemma), lack of access to capital and the lack of adequate and sufficient information. It is suggested that the EED and the EPBD address the issue of barriers in their preamble and require Member States to include such considerations in their strategy plans for building renovations. The EPBD could suggest Member States to include limits to rental rates for buildings with a low energy label to help overcoming the split-incentives barrier. The future recast of the EED could specifically address informational barriers by requiring energy suppliers to include information about specific energy efficiency options in end users' energy bills and the payback periods of investments in such options. The EED could also require Member States to communicate the benefits of advanced energy improvements widely to stakeholders that may provide access to capital for low-income households (examples of these stakeholders are banks and health insurance companies).
5. **Energy efficiency policies specifically addressing low-income households could be more effective in eradicating or reducing energy poverty than using only social policies. The choice of targeted policies is best left to the Member States:** There are large differences between Member States concerning the extent to which low-income households are reached by energy efficiency policies and the existence of additional barriers for this group. Such differences have to be taken into account when designing specific policies for this target group and consequently it is recommended that this is left to the respective Member State. It is suggested that Member States implement structural programmes to improve energy efficiency in low-income households with a long-term focus on reducing energy poverty. Several policies classified under the topic of energy audits and information campaigns already have a strong focus on low-income households. Energy audits are a very effective way to determine individual needs, in particular for low-income households. They are generally part of bigger policy programmes. Finally, the implementation of specific measures to address the uptake of energy efficiency in low-income households could be left to the level of local governments.
6. **Energy efficiency improvements have positive impacts that go beyond a reduction in energy use (e.g. improvements in health and social inclusion, reduced investments in infrastructure). It is therefore recommended that Member States use infrastructure funds from other sectors benefiting from positive impacts of energy efficiency (for example health and social welfare funds) and tie their energy efficiency policies to European social funds or investment funds to enhance policy implementation in low-income households:** The successful implementation of energy efficiency policies hinges on access to funding for energy efficiency improvements. The suggestion is that the EED and EPBD recommend the use of funds related to additional benefits of energy efficiency as a potential alternative (or additional) source of funding. Member States could support the development of innovative financing mechanism such as on-bill repayment to help low-income households overcome the investment barrier. Finally, energy efficiency policies at Member State level

could be more tied to European Strategic and Investment Funds, such as the Cohesion Fund, the European Regional Development Fund and the European Social Fund, to address specific local, regional or national barriers that low-income households face. It is recommended that the European Commission continues strengthening the streamlining and blending of the use of these European Strategic and Investment Funds and funding from the European Fund for Strategic Investments to support the linking of these funds to national energy efficiency programs and building renovation strategies. Member States in turn could pay more attention to the opportunities provided by the European Strategic and Investment Funds to address the financial barriers hindering the uptake of energy efficiency measures for low-income households.

# 1. INTRODUCTION

## 1.1. Background and objective of this study

Protecting vulnerable consumers and tackling energy poverty are policy objectives included in the European Commission's Communication on the Energy Union Package (EC, 2015a). These policy objectives are relevant to the overall EU goal of providing secure, sustainable, competitive and affordable energy for consumers.

The problem of energy poverty in Europe is not limited to colder climates; it exists in all Member States though it is more prevalent in Central and Eastern Europe, where it rose dramatically in the 1990s with the end of state subsidies for energy and increased poverty in general. It is also widespread in the south of the EU in Spain, Portugal, Italy, Greece and Cyprus, as well as in relatively well-off countries like the UK and Ireland (BPIE, 2014).

EPEE (2009), Bird et al. (2010), Bouzarovski (2013) and BPIE (2014) estimate that between 50 and 160 million people in the EU are currently suffering from energy poverty and are unable to afford proper indoor thermal comfort. The large variation in the range of people suffering from energy poverty is due to the different metrics that are used (Maxim et al., 2016; Robić et al., 2015). In 2014, 10.2 percent of the EU-28 population were unable to keep their homes adequately heated and 9.9 percent were in arrears on utility bills (EU-SILC, 2016), but these percentages were 40 percent and 32.9 percent respectively in Bulgaria. Other negative effects include increased susceptibility to disease and mortality, and poor educational outcomes (IEA, 2011). The broader negative effects of energy poverty are felt mainly by low-income households and other vulnerable communities. Several studies provide evidence that households with above-average energy needs are more susceptible to suffer energy poverty. Examples of these households are families with children, pensioners and disabled people (EP, 2016b; Liddell, 2009; Snell et al., 2015; Wright, 2004).

Energy transitions towards the decarbonisation of energy systems also affect the expansion of energy poverty. These processes can affect low-income households if the costs of low carbon interventions (such as investment in solar and wind energy) are disproportionately borne by end-consumers through energy bills (EP, 2016b). However, the impacts of energy transitions have shown to be affected by location, consumption behaviour and household size rather than income (Bourzarovski & Tirado Herrero, 2015).

The Energy Union mentions that energy poverty results from inefficient homes and a housing tenure system that fails to encourage energy efficiency (EC, 2015a). The Energy Union implicitly recognises that a combination of policies in the social field, energy efficiency improvements, reduction of energy consumption, and participation in demand response programmes are key tools to address energy poverty. In the same vein, the resolution (2013/2135(INI)) of the European Parliament called for a binding EU 2030 energy efficiency target of 40%, with accompanying individual national targets (EP, 2014).

The European Parliament's resolution of 14 April 2016 'on meeting the antipoverty target in light of increasing household costs' (EP, 2016c) calls on Member States and the Commission to 'build bridges between social policy and energy policy'. Among other measures, the resolution calls on the Member States and the EU to provide microcredits with no interest charges to low-income households for energy efficiency and renewable energy investments, and to boost energy efficiency investments in social housing. The Commission also aims to make it easier to finance energy efficiency improvements through European Structural and Investment Funds. These financing options have been made available for some energy efficiency improvements in social housing and low-income households (EC, 2013)

Coherent policies are needed to achieve the multiple benefits (environmental, economic and social) of energy efficiency in the residential sector. Policies must address the barriers to

energy efficiency for low-income households to effectively combat energy poverty with a long term vision. Adaption of framework Directives such as the EED and the EPBD, and new regulations that take into account the lessons learned by Member States and internationally are needed to unleash the full potential of energy efficiency in all household segments. Such a revised framework should differentiate between often needed social measures to rapidly alleviate energy poverty, and energy efficiency measures to achieve structural improvements for permanent energy savings and behavioural changes.

It is in this context that the ITRE Committee has requested this study on energy efficiency in low-income households. This study aims at clarifying the impacts that energy efficiency has on low-income households, and determining to what degree energy efficiency policies should specifically target low-income households, and in which circumstances they should be combined with social policies addressing energy consumption in low-income households to overcome existing barriers for this group. Findings of this study will support a balanced debate on policy options for fighting energy poverty, in particular in the context of the revision of the Energy Efficiency Directive (EED) and the Energy Performance of Buildings Directive (EPBD).

### 1.2. Methodological framework and information sources

Figure 1 presents the methodological framework of this study. The study starts by classifying and analysing the multiple benefits that energy efficiency has on low-income households. Impacts of energy efficiency are classified in environmental (energy savings, reduction of greenhouse gases emissions, reduction of air pollution, etc.), economic (costs savings, fewer energy subsidies, higher property values, reduced energy infrastructure costs, increased local employment, increased local spending and GDP, etc.) and social impacts (poverty alleviation, increased human health, increased comfort and well-being, social inclusion, reduction of undesired mobility, increased community pride and appearance, etc.). The analysis of impacts that energy efficiency has on low-income households informs the reader of the need for establishing policies that deliver all those identified multiple benefits.

The study continues with the analysis of barriers to energy efficiency in low-income households. Barriers are classified in four types: behavioural, informational, economic and administrative. Those barriers that are most relevant for low-income households are analysed in detail to understand better their causes and how they can be dealt with.

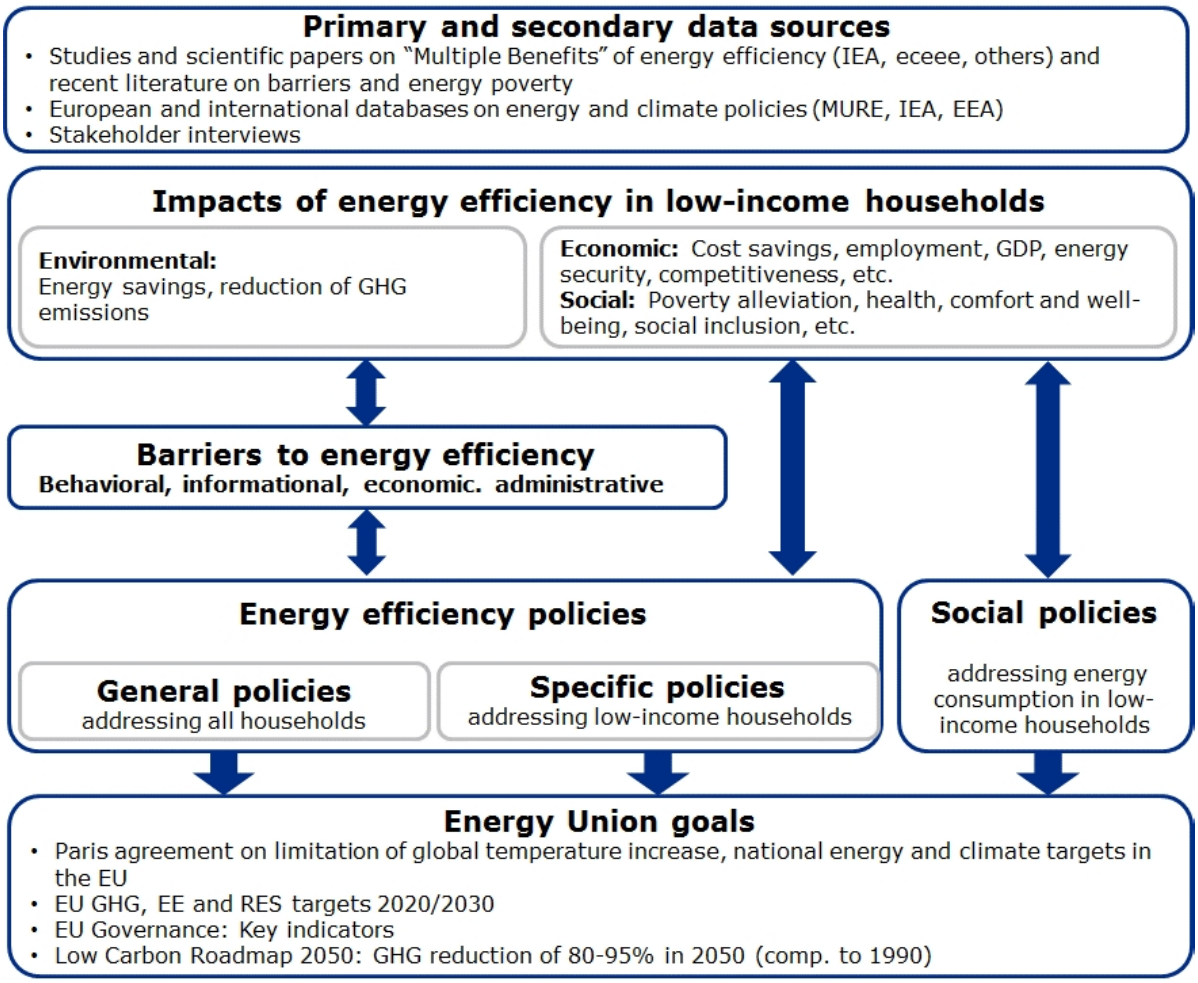
Once barriers and their causes are well understood, the study proceeds with a thorough assessment of those policies that can contribute to remove these barriers and/or contribute to deliver the multiple benefits of energy efficiency. The Energy Union (EC, 2015a) implicitly recognises that energy poverty can be addressed by a combination of both energy efficiency policies and social policies. Policies are therefore grouped in energy efficiency policies (general policies or policies specifically targeting low-income households) and social policies addressing energy consumption in low-income households. In order to find a reasonable level of aggregation, all energy efficiency and social policies are classified by the policy instruments they use: Financial, fiscal, legislative, education/information and market-based instruments. Since these five policy instruments are still too broad for a detailed analysis, several policy topics are used to better reflect the heterogeneity of specific policies. All identified policies are described and analysed in relation to their capacity to overcome the identified barriers and deliver the multiple benefits of energy efficiency, in particular the reduction of energy poverty. The factors that affect the choice of policies are also assessed and several examples of existing policies in EU Member States and abroad are presented.

The study continues with a comparative analysis of the three groups of policies (general energy efficiency policies, energy efficiency policies aimed at low-income households and social polices) to understand their capacity to remove barriers and how they contribute to achieve energy efficiency and deliver its multiple benefits. The methodology used in this

analytical study finds its limitation in the calculation of policy costs since the availability of quantitative assessments linking the cost of policies with their impacts on low-income households is scarce. However, an order of magnitude of these costs is estimated by the authors to give a rough idea of the costs of policy implementation for their later comparison with social welfare expenditure combating energy poverty. This economic comparison is not within the scope of this study.

Finally, as result of all the research and thorough analysis performed, the study culminates with the elaboration of a set of policy recommendations to improve energy efficiency in low-income households with the aim of achieving the multiple benefits of energy efficiency including the elimination or reduction of energy poverty for this group of consumers.

**Figure 1 Methodological framework**




**Source:** Authors.

The report is based on three types of data source: scientific literature and technical reports, databases of energy efficiency policies, and stakeholder interviews.

- **Scientific literature and technical reports:** Scientific literature and technical reports were used in the evaluation of barriers to energy efficiency. The efficiency gap (gap between optimal efficiency level and actual efficiency observed) has been analysed from an economic perspective, in particular whether the market can provide the right level of efficiency, or whether public policy is required (see among others: Jaffe and Stavins 1994, O'Malley et al. 2003, Sorrell et al. 2004, IEA 2007 and 2012, UNIDO 2011, ACEEE 2013, Ástmarsson et al. 2013, Thollander et al. 2010). Further, our study presents case studies of energy poverty alleviation approaches in other countries. These studies are also based on desk research. Determining the impacts of

energy efficiency policies relies on literature concerning the so-called "multiple benefits" of energy efficiency, e.g. publications by IEA (2012b, 2014), eceee (2013) and others. In addition, we rely on detailed information about the quantitative impacts of EE policies on energy consumption and GHG emissions drawn from the MURE database. Further scientific literature was also taken into account on the design and analysis of energy efficiency policies for private households in general (as e.g. BPIE 2012, Eichhammer et al. 2012, Schlomann 2014, Gynther et al. 2015, Markandya 2015) and with specific regard to low-income households (for example: Anderson et al. 2010, Rosenow et al. 2013, BPIE 2014, Brunnera et al. 2014, Crémieux et al. 2014, Schumacher et al. 2015, SRU 2016).

- **Databases of energy efficiency policies:** A comprehensive overview of residential energy efficiency policies in the EU is presented in this report based on databases of energy and climate policies, in particular but not limited to the MURE database[1]. The MURE database is the largest and most comprehensive database of energy efficiency policy measures for the EU including impact evaluations (around 2400 measures). It is based on national policy documents such as the National Energy Efficiency Action Plans (NEEAPs) provided by EU Member States under the EU Energy Efficiency Directive (2012/27/EU; EED).
- **Stakeholder interviews:** Given the novelty of tailoring energy efficiency policies to low-income households, stakeholder consultations were held with representatives of different organisations. These consultations were based on semi-structured interviews adapted to the respective stakeholders containing questions about barriers to efficiency in the low-income sector, the impacts and benefits of energy efficiency, as well as the respective stakeholder´s view of policy options. Some results of these interviews are displayed in boxes in the corresponding sections of this report. These interviews helped to validate certain results, such as the most relevant barriers to energy efficiency in the low-income sector (where only limited scientific literature is available). The conclusions and suggested policy options also consider the variety of views in these interviews. Table 13 in Annex 1 provides an overview of the interviews performed, showing the stakeholder, his/her position and organization as well as the main topics discussed.

### 1.3. How to read this report?

This report covers a wide range of barriers to energy efficiency and the policies intended to address them. The following paragraphs describe the specific content of each chapter.

**Chapter 1** starts with describing the background to the main question of this report, namely what impacts energy efficiency has on low-income households, and to what degree energy efficiency policies should specifically target low-income households, and in which circumstances they should be combined with social policies addressing energy consumption in low-income households to overcome existing barriers for this group. The chapter continues by describing the methodological framework used for the analysis, the information sources used, and the structure of this report.

**Chapter 2** analyses the multiple benefits that energy efficiency has on low-income households and classifies them in environmental, economic and social impacts.

**Chapter 3** provides a comprehensive classification and analysis of barriers to energy efficiency in low-income households. Barriers are classified into four categories: behavioural, informational, economic and administrative. Those barriers that are most relevant for low-

[1] Other databases to be mentioned here are the IEA database on energy efficiency policies & measures and the EEA database on climate change mitigation policies and measures.

income households are analysed in detail to understand what causes them. Special attention is given to the split incentives barrier (also known as the landlord-tenant dilemma)

**Chapter 4** provides a thorough policy assessment. It starts by describing the EU policy framework and continues with proposing a classification of those policies (energy efficiency and social policies) that can contribute to remove barriers and/or contribute to deliver the multiple benefits of energy efficiency. Identified policies are described and analysed in relation to their capacity to overcome the identified barriers and deliver the multiple benefits of energy efficiency, in particular the reduction of energy poverty. The factors that affect the choice of policies are also assessed and several examples of existing policies in EU Member States and abroad are presented. Finally, this chapter presents a comparative analysis to help identify good practices.

**Chapter 5** presents conclusions and policy recommendations to improve energy efficiency in low-income households and achieve the multiple benefits of energy efficiency. These policy recommendations are aligned with the goals established by the Energy Union and EU framework energy policy. These recommendations do not conclude on political choices, but analyse the consequences of different policy choices.

# 2. IMPACTS OF ENERGY EFFICIENCY

**KEY FINDINGS**

- A variety of definitions for low-income households and energy poverty exists and a common definition may help standardise policy and increase political visibility but also runs the risk of erasing social demographic and regional complexities.
- The lack of energy efficiency is a key factor driving vulnerability to energy poverty because of the potential disproportionate high loss of useful energy in households.
- There is increasing evidence that energy efficiency does not only lead to reduction or elimination of energy poverty, but to wider benefits for vulnerable consumers, the economy, and the society in general (improved health, increased local spending and employment, less energy subsidies, higher property values, social inclusion, several local and infrastructure improvements, etc.).
- Several studies conclude that the positive impacts on human health, well-being and improved living comfort are an exclusive benefit from energy efficiency. To date, programmes for energy efficiency retrofitting of low-income households in the world have delivered the greatest benefits, with health improvements representing as much as 75% of the total return on the investment for these measures.
- Environmental impacts such as energy savings and reduced GHG emissions are evident. Buildings are responsible for 36 percent of $CO_2$ emissions in the EU. If the EU's climate targets are to be met, all households, including low-income ones, must reach an adequate level of energy efficiency.
- Energy efficiency impacts go beyond the environmental ones. A rebound effect driven by a low-income household's choice to increase comfort and improve the conditions for health, well-being and productivity is unlikely to be considered as a negative result, but as a net positive outcome, amplifying the benefits of the energy efficiency.

## 2.1. Energy poverty definition

A variety of definitions for low-income households and energy poverty exists (see Box 1). A more integrated approach is needed to measure[2] and evaluate energy poverty. Data on building energy performance and on health issues related to energy poverty is not harmonised at the European level and provided to Member States by a central office, e.g. Eurostat (EP, 2015a). The fight against energy poverty finds its first obstacle in the inability to unambiguously identify the energy-poor households across the EU. This is because the lack of a common definition of energy poverty results in not having official figures and indicators measuring the extent and impacts of energy poverty. The lack of a common definition also makes it more difficult to implement a common EU approach and include more specific guidance or requirements concerning energy efficiency measures addressed to low-income households in the EU policy framework. The lack of a common EU approach results in energy poverty being addressed in different ways in EU Member States. Some have explicit energy poverty reduction strategies (UK, Ireland, France), but most are essentially only

[2] There are three approaches to measuring energy or fuel poverty: (1) expenditure approach – from a flat 10% line of household income to twice the median of household expenditure on energy utilities; (2) temperature-based approach – share of households with indoor temperature below the thermal comfort standard as defined by the World Health Organization; and (3) self-reported energy or fuel poverty based on evidence of arrears of energy utility bills, inadequately heated housing and poor housing quality (Tirado-Herrero, 2013).

dealing with the elimination of its symptoms, but not its root causes (Bouzarovski, 2014; IEA, 2014).

**Box 1: Variety of definitions for low-income households and energy poverty**

A household is generally defined as one person living alone or a group of people (not necessarily related) living at the same address who share cooking facilities and share a living room, sitting room, or dining area. The term 'low-income household' has several different though similar definitions. In the UK, a household is considered to have low income if its income is below 60% of the median household income (after taxes and benefits)[3]. In the USA, 'low-income households' are those earning less than twice the federal poverty line (Roberts et al, 2013).

The term 'energy poverty' is used differently in developing and developed countries. In developing countries, this term most often refers to the lack of access to electricity. In developed countries, it usually refers to the inability to afford the energy one needs. Energy poverty in Europe has often been understood via other terms, such as 'cold homes', 'non-payment', and 'energy precariousness' (Anderson et al., 2010; Lampietti & Meyer, 2002; Wilhite et al., 1996; World Bank, 1999).

It was the work from Brenda Boardman (1991) in the UK that first described in an exhaustive manner the problem of energy poverty in households. Boardman understood 'fuel poverty' as the inability of a household to afford domestic heating – and other energy services – in cases where it needed to spend more than 10 per cent of its income for this purpose. The 10 per cent figure was derived from a study that showed deprivation to occur when the burden of energy exceeded double the national median (Isherwood & Hancock, 1979). The UK defines 'fuel poverty' as the situation in which a household's required fuel costs are above the median level, and in which, if they were to spend what is required, the household would be left with a residual income below the official poverty line (Hills, 2012).

A more modern and holistic definition of energy poverty is given by Bouzarovski & Petrova (2015), who claim that energy or fuel poverty in developed and developing countries is essentially the same condition: "the inability to attain a socially and materially necessitated level of domestic energy services". Energy poverty can be an outcome of either, or both: lack of access to energy services or unaffordable prices of fuel and energy services (Bouzarovski & Petrova, 2015).

A common definition of energy poverty in the EU has supporters and detractors. The EP briefing on energy poverty landscapes in the European Union (EP, 2016b) compiles arguments given by different experts[4] in favour and against a common definition of energy poverty in the EU. Arguments in favour are the higher political visibility and public awareness, the possibility of developing a common language surrounding the problem, the ability to devise standardised statistics and measures, and the opportunities for integration with different policy domains. Arguments against are the risk of erasing the complexity of multiple components interacting in energy poverty, the risk of prioritising specific groups of vulnerable consumers over others due to targeting inaccuracies, and the risk of dismissing region and country-specific differences. In short, a common definition may help standardise policy and increase political visibility but also runs the risk of erasing social demographic and regional complexities (EP, 2016b).

[3] Definition used by the Households below average income (HBAI) statistics from the UK Department for Works and Pensions

[4] Bouzarovski et al., 2012; Deller, 2016; Fellegi & Fullop , 2012; Healy, 2004; Kapteyn et al, 1988; Thomson et al., 2016

## 2.2. The case for energy efficiency in low-income households

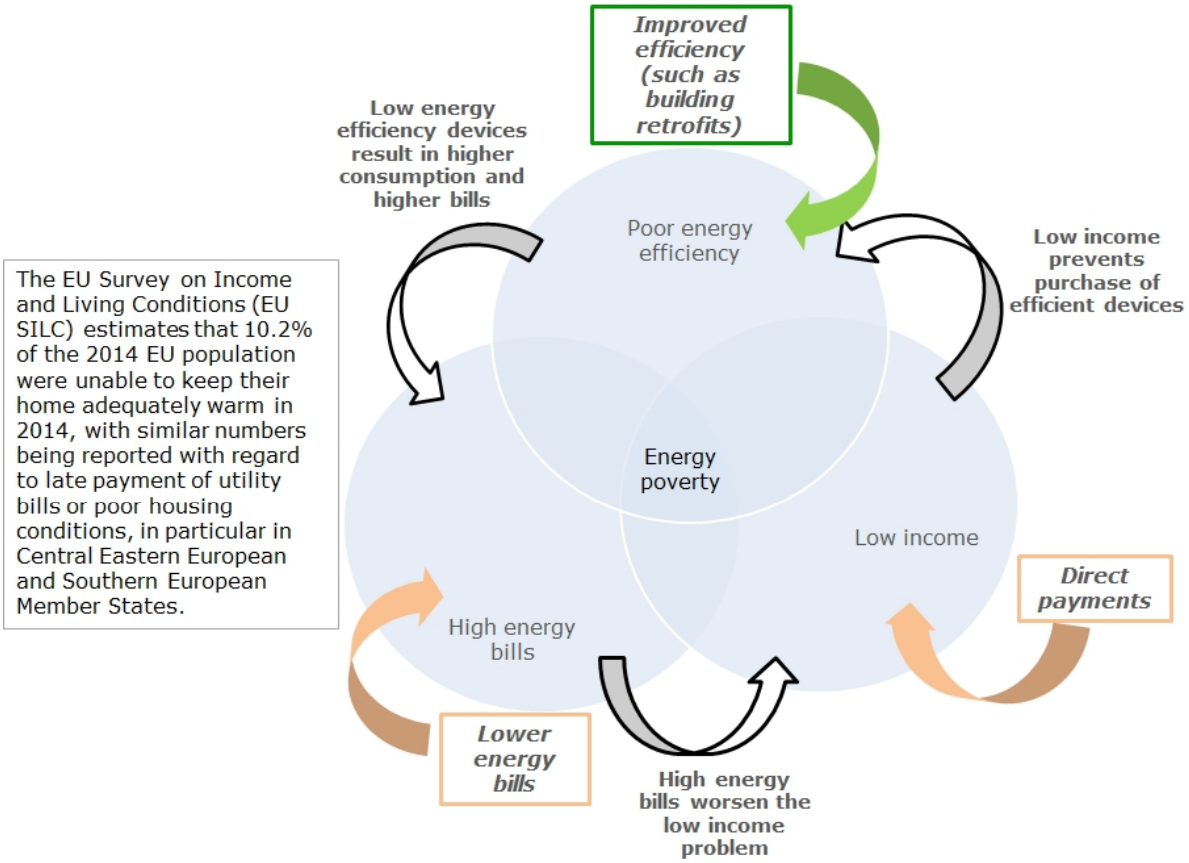
The lack of energy efficiency is a key factor driving vulnerability to energy poverty because of the potential disproportionate high loss of useful energy during energy conversions in the home (Bouzarovski & Petrova, 2015). The low energy performance in houses and buildings, and the use of inefficient energy appliances lead to higher energy needs and hence higher costs. Poor energy efficiency of the living space (particularly in buildings), low income and high energy bills can combine to form a vicious cycle in which energy poverty is aggravated (see Figure 2). Low-income households are especially affected by energy poverty since they cannot afford newer, more efficient appliances (Bouzarovski, 2014) and often live in older non-refurbished buildings[5] paying significantly higher energy bills compared to people living in energy efficient buildings enjoying the same level of comfort.

However, the location of energy poverty at the intersection of incomes, prices and energy efficiency (see Figure 2) means that this condition is a form of material deprivation that extends beyond income poverty (EP, 2015b). Income poverty is when a family's income fails to meet a federally established threshold that differs across countries. Typically income poverty is measured with respect to families and not the individual, and is adjusted for the number of persons in a family (Hagenaars et al., 1985; Hagenaars et al., 1988; Ravallion, 1992). For example, Bouzarovski (2014) argues that in Eastern European Member States, the rise of energy poverty is mostly due to the lack of investment in energy efficiency and the provision of appropriate social welfare in the period since the fall of communism. In post-communist Eastern European countries (including the Balkans), people not necessarily suffering income poverty often become 'trapped' in housing arrangements with inflexible heating systems, underpinned by the inability to switch to a more financially accessible or technically convenient form of energy service provision (Bouzarovski & Tirado Herrero, 2016; Buzar, 2007; Tirado Herrero & Urge-Vorsatz, 2012).

In the UK and Ireland, it has been demonstrated that it is the combination of low household incomes and energy inefficient homes that has led to record levels of energy poverty, despite these two countries' relatively mild climates (Clinch & Healy, 2004; Liddell et al., 2012).

[5] In 2014, 15.7% of the EU-28 population lived in a dwelling with a leaking roof, damp walls, floors or foundation, or rotting window frames or floors (EU-SILC, 2016)

**Figure 2 Vicious cycle causing energy poverty**

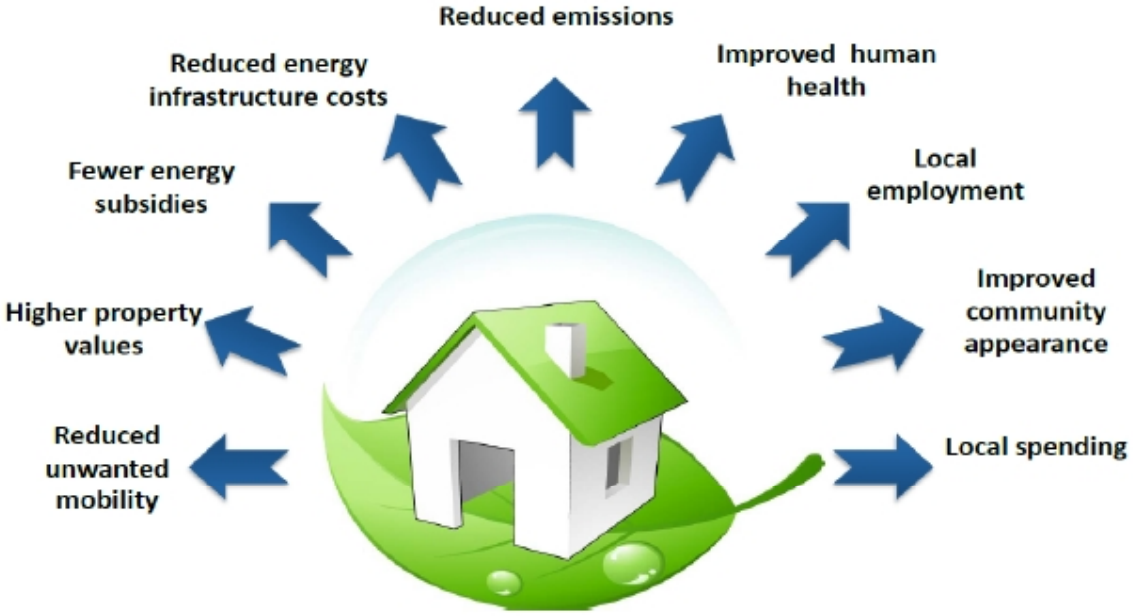



**Source:** Authors.

Some studies have concluded that most low-income households keep up with their energy bills but typically cut back on food and heating (Anderson et al, 2010), (Brunnera et al, 2012). This situation exacerbates other negative effects caused by poor energy efficiency in these households and call for more robust energy efficiency measures. Energy efficiency in low-income households also help to mitigate the risk of higher energy bills due to the costs of financing the transition to renewable energies.

Improving energy efficiency of low income households is crucial for the long-term solution to energy poverty. Beyond this, there is also increasing evidence that energy efficiency will lead to numerous wider benefits for the economy, consumers and society (EC, 2015a). Energy efficiency results in multiple benefits beyond the reduction of primary or final energy consumption and lowering GHG emissions (IEA, 2014). The range of energy efficiency benefits for low-income households include issues such as positive health and employment, as well as several local and infrastructure improvements (see Figure 3).

**Figure 3 Specific benefits from energy efficiency in low-income households**




**Source:** (IEA, 2011).

## 2.3. Environmental impacts

Environmental impacts such as energy savings and reduced GHG emissions are evident. Buildings are responsible for 36 percent of $CO_2$ emissions in the EU. The EU's Energy Efficiency Plan 2011 identified buildings as having the largest energy-saving potential. Environmental impacts include the direct effects of energy efficiency on primary and final energy consumption and mediating effects on GHG and other emissions by reducing energy consumption and thus lowering the primary energy consumption of the energy conversion sector for heat and electricity generation and (renewable) heating systems in buildings.

Meeting the EU's overall GHG emission reduction targets will require that the targeted zero emission levels are achieved in all new and existing buildings (including low-income households) by 2050. The economic energy-saving potential in the EU-28's residential sector amounts to around 73 Mtoe for a high policy intensity scenario (HPI) compared to the reference scenario in 2030 (Fraunhofer ISI, 2014). However, it is more difficult to exploit saving potentials in the low-income household sector since these households are subject to additional barriers to energy efficiency (see Chapter 3).

## 2.4. Economic impacts

Energy efficiency can lead to numerous wider economic benefits for consumers and society. Economic impacts of energy efficiency include positive effects on public budgets and on the energy systems. Energy efficiency results also in improved grid stability, reduced network losses and reduced costs for system upgrades (EC, 2015a).

Direct and indirect economic impacts of energy efficiency have been modelled by several studies (Fraunhofer ISI et al. 2009, Lehr et al. 2012, Cambridge Econometrics 2013, Hartwig and Schade 2014, Öko Institute and Fraunhofer ISI 2015, Ringel et al. 2016). Issues like improved GDP, employment, competitiveness and energy security are characterised as positive multiple benefits of energy efficiency. These improvements also reduces the amount of social assistance and subsidies to low-income households.

Impacts on GDP and employment are mainly caused by investments associated with energy efficiency such as energy-efficient renovation and construction. In 2015, the order of magnitude of the building renovation market in the EU-28 was assessed at around € 109

billion and 882,900 jobs (Saheb, 2016). Recent studies show that the strongest impacts on employment result from building policies (Saheb, 2016; Ringel et al. 2016, Öko-Institute and Fraunhofer ISI 2015). For example, the number of additional jobs in Germany to be created by the year 2020 thanks to a bundle of new energy efficiency policies is estimated at 48,000, compared with a reference scenario (Ringel et al., 2016). More than 55 percent of these jobs are expected in the construction sector. These jobs will mainly be created at regional and local levels, which is especially an advantage for the low-income population.

Energy-efficiency investments in low-income households can also yield direct financial benefits for energy providers. Energy providers can reduce the loss-making sales of energy delivered to low-income households on social tariffs, the cost of billing arrears and bad debt write-offs (IEA, 2011).

Other economic impact of energy efficiency is the increased property values as buildings are improved and rehabilitated (IEA, 2011). From the interviews with experts (see Annex 1), Professor Bouzarovski revealed that in some cases the improved energy efficiency of social housing has led to gentrification[6] and the eviction of households from improved rental dwellings as rents increased, particularly in Germany. To avoid this negative effect, Professor Bouzarovski recommends to involve the entire neighbourhoods in the energy efficiency intervention, and not only individual dwellings.

## 2.5. Social impacts

Another group of impacts, less often studied, covers social aspects such as alleviation of energy poverty, health, well-being, improved living comfort, disposable income and greater social inclusion. These are aspects that specifically affect low-income households. Energy efficiency policies addressed to retrofit buildings could act on related public policy goals (Mzavanadze et al., 2015). Retrofits can result in important social impacts as they create conditions that support improved health and well-being, particularly among vulnerable groups such as children, pregnant women, the elderly and those with pre-existing illnesses. These impacts are an exclusive benefit from energy efficiency improvements to low-income households (Lidell and Morris, 2010; IEA, 2011; BPIE, 2014). The study by IEA (2014) concludes that housing retrofits offer a more enduring solution than subsidies and grants by addressing the cause of fuel poverty, rather than the symptoms

Impacts on health include the reduction of mortality, the reduction of symptoms of respiratory and cardiovascular conditions, rheumatism, arthritis and allergies, as well as fewer injuries (IEA, 2014). Different studies recommend that indoor temperatures be maintained above 18°C as otherwise the prolonged exposure to lower temperatures may cause physical unrest and even mental diseases (Gilbertson et al., 2012; Howden-Chapman et al., 2012). As shown in Figure 4, housing retrofit measures may result in three measurable outcomes: changes in indoor average temperatures, changes in humidity and changes in indoor air quality (Mzavanadze et al., 2015).

A particular and difficult to eradicate problem with poor energy efficiency is condensation and mould. Fraunhofer IBP (2016) estimates that living in damp homes increases risk of asthma by 40%. In total, 84 million Europeans live in damp or mouldy dwellings, and 2.2 million have asthma as a direct result of living in damp or mouldy buildings (Fraunhofer IBP, 2016). Humidity or dampness leads to microbial, fungal and bacterial growth that may eventually be a cause of respiratory problems, allergies, asthma and immunity-related problems that are difficult or not possible to cure once contracted. Overall around 13 percent of all dwellings

[6] Gentrification is a process of renovation and revival of deteriorated urban neighbourhoods by means of influx of more affluent residents, which results in increased property values and the displacing of lower-income families and small businesses.

in Europe are thought to have a dampness problem (Kolokotsa, 2015). A US study estimated the cost of asthma induced by dampness and mould in homes at US$ 3.5 billion per year (Mudarri and Fisk, 2007).

Retrofit measures are an effective way to prevent mould. This suggests that long-term health cost savings can be achieved with these measures (IEA, 2011; Boardman, 2011). Good results have been achieved by existing programmes. For example, children in families benefiting from the Low-Income Home Energy Assistance Program (LIHEAP) in the United States are 20 percent less likely to be underweight and 30 percent less likely to require admission on the day of visiting a hospital emergency room, than children in similar families with no LIHEAP assistance (IEA, 2011).

Housing retrofit programmes are also effective in preventing other important health risks like those caused by asbestos and other materials still present in some dwellings. Asbestos (banned in the EU in the late '90s) was formerly used as a fire-resistant insulation material. Exposures to remaining asbestos in buildings continue to pose a threat to human health (Sim, 2013; Kameda et al., 2014).

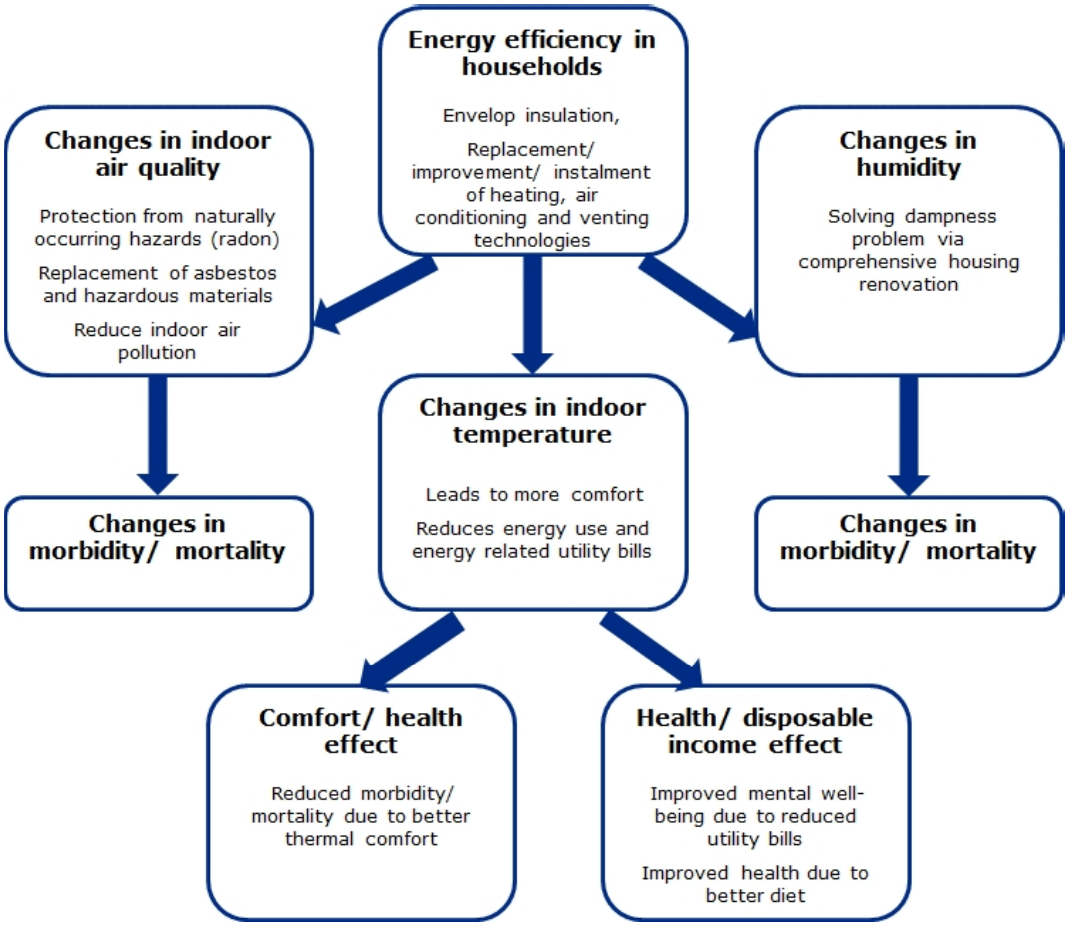
Housing retrofits can also address issues of social inclusion such as isolation arising from people feeling embarrassed by their uncomfortable living conditions (Barton, Basham and Shaw, 2004; Bashir et al., 2014). People in low-income households also often face the "heat or eat" syndrome[7]. Housing retrofit helps to address the problems (such as malnutrition and obesity) of this trade (Cook et al., 2008; Howden-Chapman et al., 2012).

Other studies have shown the positive impacts of housing retrofits on mental health and the reduction to half in the incidence of anxiety or depression after energy-efficiency measures (Anderson et al., 2010; Green and Gilbertson, 2008; Liddell and Guiney, 2014).

Other important social impacts produced by improved energy efficiency in low-income households are the lower frequency of moving house, improved school and work attendance, and improvements in household comfort and safety (IEA, 2011). Less tangible but relevant to people's well-being are the positive impacts on community pride, improved access to local services and social cohesion (Dempsey et al., 2011).

[7] The "heat or eat" syndrome occurs when a choice has to be made to between adequate energy services and other essentials such as food.

**Figure 4 Main social impacts from energy efficiency in low-income households**




**Source:** Adapted from (Mzavanadze et al., 2015).

Some assessments have calculated the value of housing retrofit measures. Grimes et al (2012) have concluded that worldwide retrofitting low-income households have delivered as much as 75% of the total return on the investment. For the specific case of Europe, the assessment made by Copenhagen Economics (2012) concluded that benefits from reduced indoor air pollution out to 2020 are worth € 33 billion to € 73 billion annually in a low energy efficiency scenario and as much as € 64 billion to € 140 billion annually in a high energy efficiency scenario. These benefits are derived from values for improved life quality, lowered public health spending and fewer missed days of work.

## 2.6. Rebound effects

Rebound effects occur when consumers redirect energy savings towards other energy-consuming activities. This rebound effect may often signal a positive outcome in terms of achieving broader social and economic goals (IEA, 2014). A multiple-benefits perspective helps to understand the impacts of rebound effects, as well as their sources and causes. This better understanding of rebound effects helps to manage trade-offs that might take place.

Common trade-offs that might take place are the consumer's response to increased insulation in a dwelling. Some consumers from low-income households might prefer to save the money resulting from the reduction of the energy bill. However, other consumers may use the money saved to increase the use of additional energy services such as increase heating in under-heated areas of the dwelling because bill-paying occupants feel the money is now better spent (Howden-Chapman et al., 2012). The rebound effect can be as high as 10% to 30% of projected energy demand reduction (Sunikka-Blandk and Galvin, 2012; Sorrell, 2007; Jenkins et al., 2011). The rebound effect is likely to be higher in low-income households

(Milne and Boardman, 2000). Giving consumers this choice is what matters though. A rebound effect driven by a household's choice to increase comfort and improve the conditions for health, well-being and productivity is unlikely to be considered as a negative result overall (IEA, 2014). In this case, the rebound effect should be considered positive because energy efficiency is already bringing multiple socio-economic benefits.

## 2.7. Conclusions

All buildings will have to have zero emission levels by 2050 to meet the EU's overall climate targets. This requires all household segments to be energy-efficient. But energy efficiency cause several further positive impacts beyond the reduction of energy consumption and lowering GHG emissions. Taken together, these positive impacts are one justification for energy efficiency policies targeting all end-users, and especially low-income households, which form the main target group of this study.

Improving energy efficiency of low income households is crucial for the long-term solution to energy poverty. Energy efficiency retrofits in low-income households (e.g. insulation retrofits and weatherisation) result in structural improvements. These measures are the biggest drivers of social impacts as they create conditions that support improved occupant health, well-being and living comfort, disposable income and greater social inclusion. For low-income households, especially social employment effects and social effects, i.e. alleviation of energy poverty, health and comfort effects play the most important role. In this respect, the evaluation of rebound effects, in which expected energy demand reductions are not achieved because financial savings from lower energy costs are reinvested in more goods and services, should be done carefully as they are not necessarily negative, depending on the specific circumstances. They can actually be a good thing from the perspective of contributing to economic and social objectives if the benefits acquired are of greater value to occupants of the low-income household and of greater value to society. The rebound effect must be assessed against the backdrop of the specific benefit(s) being targeted. Unbundling the relationship between energy savings and the broader outcomes of energy efficiency can provide a better understanding of the rebound effect, and a clearer appreciation of whether this effect reduces or amplifies the benefits of energy efficiency measures.

The significant health and well-being benefits that have been recorded following energy efficiency improvements present a compelling argument for increased efforts to understand what energy efficiency can deliver directly and indirectly to individuals and communities, and from a public health perspective. The evidence base for direct impacts on physical health is growing, and a case is also emerging for impacts on mental health and a range of more indirect impacts (IEA, 2014). This case could support the inclusion of health and well-being impacts as stated objectives within new energy efficiency measures, thereby supplying the policy decision-making process with increasingly robust estimations of potential policy impacts.

# 3. BARRIERS TO ENERGY EFFICIENCY

**KEY FINDINGS**

- Barriers are especially persistent for low-income households. Most prominently, lack of information, lack of capital, and the split incentives barrier. It is estimated that between 10 to 25 percent of the potential savings in low-income households will be extremely difficult to exploit without specific policies removing those barriers.
- Lack of sufficient and adequate information leads to market failure because individuals cannot judge what the optimal level of energy efficiency is. Removal of informational barriers is very important because when information about the benefits of energy efficiency reaches the targeted low-income household, behavioural barriers are more likely to disappear, and the search of financing is to some extent facilitated.
- The split incentives barrier is relevant because people with low income tend to live as tenants and cannot afford larger energy efficiency investments. The split incentives barrier also restrains landlords from doing costly refurbishments.

## 3.1. Relevant barriers for low-income households

Barriers to energy efficiency are defined as circumstances or obstacles that prevent individuals or organisations from implementing higher energy efficiency technologies, even though their implementation would make sense from an economic point of view (IEA 2012). The presence of barriers explains the so-called energy gap between potential cost-effective energy efficiency measures and the measures actually implemented in real life (Thollander, 2010). Table 14 in Annex 2 presents a compilation of 27 barriers in the residential sector. These barriers[8] were categorised into four main groups: behavioural, informational, economic and administrative barriers.

Lack of information specifically addressing low-income households sometimes combined with low levels of education[9] are the main behavioural and informational barriers in low-income households. Lack of access to funds, higher risk aversion and misaligned incentives particularly also restrain the improvement of energy efficiency in low-income households. These barriers and their causes are presented in Table 1.It is estimated that at least 10 percent, or up to almost 25 percent of the potential savings in low-income households will be extremely difficult to exploit without any specific policies removing the barriers to energy efficiency in low-income households (Fraunhofer ISI, 2014).

**Table 1 Barriers affecting low-income households**

| Type | Barrier | Causes |
|---|---|---|
| Behavioural | No general awareness of benefits of energy efficiency measures | Market participants lack information to make profit-making decisions. Lack of awareness of the possible benefits of energy efficiency measures may be caused by low levels of education. |
| Informational – Dwelling | No knowledge about energy consumption of the dwelling | Information not only creates awareness of possible savings, but also makes it possible to quantify the |

[8] Sorell et al. (2000), Thollander et al. (2010), IEA (2012), Fraunhofer ISE et al. (2012) provide comprehensive overviews on barriers.

[9] Low levels of education are positively correlated with lower levels of income (Eurostat, 2013). While this correlation exists, it cannot be generalised.

| Type | Barrier | Causes |
|---|---|---|
| | Misperception of known consumption / lack of knowledge about saving potentials | net benefits of energy efficiency investments by providing the basis for a cost-benefit analysis. Low-income households that also suffer from low levels of education tend to have less knowledge about the energy consumption and saving potentials of their dwelling, the difference between the maintenance costs of energy devices and efficiency improvements. Energy allowances via social security payments might also discourage households from analysing their energy consumption. Lack of information or knowledge restrain participants to behave in a profit-maximising way. |
| | No understanding of the difference between general maintenance costs and energetic improvements due to new investments | |
| Informational – external | Lack of understandable information (complexity and form of information) | Energy efficiency benefits are heterogeneous; they depend on consumption patterns, devices and appliances used, etc. Non-availability of understandable information specifically addressed to low-income households, lack of information to participate in support programmes, lack of information campaigns and advisory services constitute important barriers to energy efficiency improvements. Lack of information restrains participants to behave in a profit-maximising way. |
| | Lack of person-specific information due to heterogeneity of individual benefits | |
| | Lack of specific information about support programmes providing loans/grants | |
| | Lack of information about consultancy and advisory services | |
| Economic – Financial | Lack of access to internal capital | Low-income households have fewer savings (e.g. less access to internal capital) and therefore an economic financial barrier to energy efficiency. |
| | Lack of access to external capital | Credit worthiness is lower for low-income households than for high-income households. This causes lack of access to external capital and loans. |
| Economic – incentives | Split incentives | Split incentives represent a situation in which property rights are legally but not factually assigned to one agent. Therefore the costs and benefits of economic transactions do not affect the same agent. A common example is the landlord-tenant dilemma, where neither has the incentive to invest because the other party will benefit from the investment (see section 3.2). The landlord-tenant dilemma plays a crucial role in the residential sector given that about 30% of the EU's population live as tenants. People with low incomes are more likely to be tenants and therefore more exposed to this barrier. |
| | Subsidies on energy prices | In competitive markets, prices are the result of supply and demand. They are a signal of scarcity and incentivise participants in their market behaviour. Energy cost subsidies represent a distortion of markets[10] and incentivise higher consumption of |

[10] According to the law of demand, the higher the price of a good, the less it will be demanded, and vice versa, the lower the price, the higher the demand.

| Type | Barrier | Causes |
|---|---|---|
| | | energy. They also make investments in energy conservation technologies less attractive by prolonging their amortisation time. Energy cost subsidies explicitly conceived for low-income households exist in nearly all Member States via their social security systems. |
| Economic – risk aversion | Risk aversion due to long amortisation time | Low-income households have difficulties coping with everyday expenditures. Energy efficiency investments involve direct and certain upfront costs and less certain benefits. |
| | Risk aversion due to uncertainty about own future economic situation | Low-income households are more dependent on their monthly income to cope with daily expenditures. This dependency creates more uncertainty regarding their future economic situation compared to higher income households. |
| | Risk aversion due to general preference for equity over debt | Low-income households might be more reluctant to acquire debts as their ability to cope with them in the future is less certain than in higher income households. If the preference for equity over debt is not based on a rational cost-benefit analysis but reflects bounded-rationality behaviour, then it implies that participating agents do not behave in a profit-maximising way[11]. |

**Source:** Authors based on Jaffe and Stavins (1994), Sorell et al. (2000), Perman et al. (2003), Thollander et al. (2010), IEA (2012), Fraunhofer ISE et al. (2012).

### Box 2: Experience of EnergieHeld dealing with the informational barriers

EnergieHeld was founded in 2012 as an online advice service for households interested in thermal renovation measures. EnergieHeld offers a check of thermal efficiency measures through their web page, a hotline, as well as face to face advice. Customers receive a financial offer for implementing the identified measures. These offers are forwarded to a specialised ESCOS. Most customers are home owners and approach EnergieHeld with concrete modernisation measures in mind and seeking information on costs and benefits. Only a small share of customers are interested in a detailed assessment of their energy saving potentials. People are mostly interested in modernising visible parts of their house. However, there are many other renovation measures that are relatively cheap and would make economic sense. These include the hydraulic calibration of the heating system (which pays off within 2-3 years) and thermal insulation of roofs or walls (investment that can be recovered in 3-5 years). However, several barriers inhibit home owners from making such sensible energy efficiency investments; in particular, lack of awareness, lack of information, and lack of access to capital. Several support schemes offering low-cost financing and allowances for the thermal renovation of buildings exist in Germany: KfW Bank credits, communal support schemes, tax deductibility schemes, among others. However, according to Pascal Ludynia, former CEO of EnergieHeld, "*for a normal household owner, support schemes represent a complex and non-transparent topic. A central information platform on support schemes, eligibility requirements and administrative procedures is missing in Germany. Policy measures could help to harmonise support schemes and inform households in a targeted way to uncover the huge potential of household refurbishment.*"

[11] This preference has been reported as an important barrier towards household refurbishments in Germany (Fraunhofer ISE et al, 2012).

### 3.2. The split incentives barrier

The split incentives barrier is specifically outlined by the EED in statement 48 of its preamble: *"There is a need to identify and remove regulatory and non-regulatory barriers to the use of energy performance contracting and other third-party financing arrangements for energy savings. These barriers include accounting rules and practices that prevent capital investments and annual financial savings resulting from energy efficiency improvement measures from being adequately reflected in the accounts for the whole life of the investment. Obstacles to the renovating of the existing building stock based on a* ***split of incentives between the different actors*** *concerned should also be tackled at national level."*

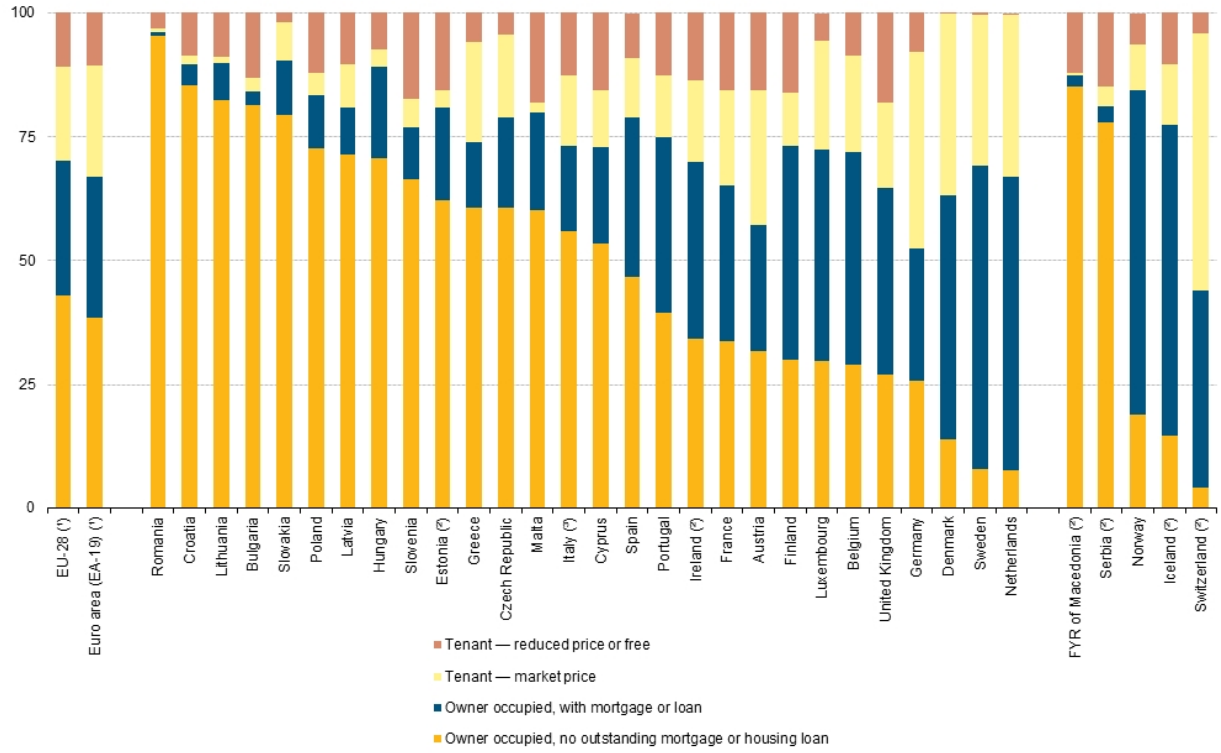
As well as in article 19: *"Member States shall evaluate and if necessary take appropriate measures to remove regulatory and non-regulatory barriers to energy efficiency, without prejudice to the basic principles of the property and tenancy law of the Member States, in particular as regards:* ***(a) the split of incentives between the owner and the tenant of a building or among owners,*** *with a view to ensuring that these parties are not deterred from making efficiency-improving investments that they would otherwise have made by the fact that they will not individually obtain the full benefits or by the absence of rules for dividing the costs and benefits between them, including national rules and measures regulating decision- making processes in multi-owner properties;"*

The split incentives barrier is also referred to in the literature as the landlord-tenant dilemma or principal-agent problem. It represents a situation in which the costs and benefits of an economic transaction (such as investing in energy efficiency) are split between different parties, thereby creating different incentives among them. Sorell et al. (2000) describe the problem as the inability to appropriate the benefits of an investment, a problem that originates through a combination of asymmetric information and high transaction costs.

**Information asymmetry**: In the absence of information asymmetry, landlords and tenants would be able to enter into contracts to share the net benefits of energy efficiency investments (Jaffe & Stavins, 1994; Sorell et al., 2000). To illustrate this, Sorell et al. (2000) explain that if no information barriers would exist, landlords investing in efficiency measures could recover the value of the investment through increased rents, or in cases where the landlord pays the energy bill, tenants could make the investment and recover the cost through reduced rents.

**Transaction costs**: The possible gains from sharing net-benefits are offset by the transaction costs involved. Participating agents require additional information, not only on the transaction as such, but also on how its costs and benefits are split. The information and transaction arrangements required can be complex and non-transparent, preventing participants from investing.

**Figure 5 Distribution of population by tenure status**

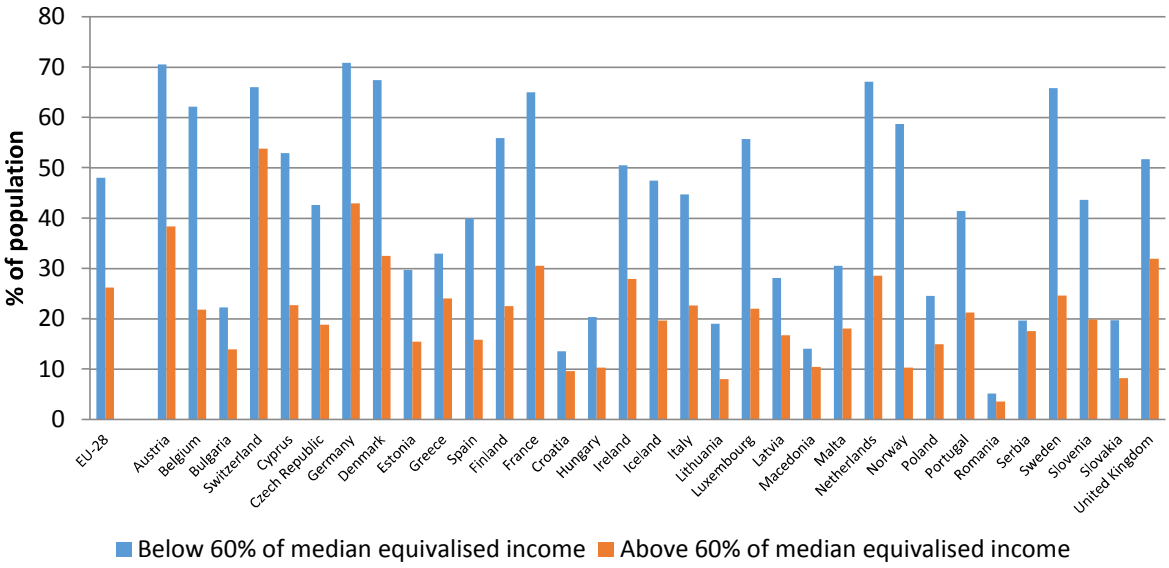



**Source:** (Eurostat, 2013).

The relevance of this barrier becomes apparent when considering the significant share of EU population living as tenants (Figure 5) and the fact that people with low incomes are more likely to live in rented accommodation (Figure 6). In 2014, approximately 30 percent of the EU population lived as tenants, with large differences among Member States. More than 48 percent of Germany's population live as tenants, while tenants only make up 4 percent of the population in Romania (Figure 5). The lack of adequate domestic energy services for tenants is most of times a result of broader inequalities in the governance of the housing stock, often including issues of housing tenure – with households in the private sector being particularly disadvantaged (Ambrose, 2015; Bouzarovski & Cauvain, 2016).

Figure 6 shows the share of population living as tenants below and above 60 percent of the median equivalised income. The population share living as tenants is substantially higher in the lower income segment (i.e. below the 60 percent median income) for all EU Member States without exception. This indicates that the split incentives barrier is more likely to be present in the low-income segment. The energy efficiency measures affected by the split incentives barrier are those that are permanently attached to the dwelling. These measures comprise household refurbishments such as the thermal insulation of roofs, walls, windows, heating system upgrade, etc. which are typically capital-intensive and thereby less accessible to those with low income. Conversely, replacing old, inefficient electrical appliances with new ones (such as lighting, refrigerators, wash machines, etc.), either by the tenant or the landlord as long as it is also the person paying the energy bill, represents in most cases cost-effective energy efficiency measures that are accessible to low-income households.

**Figure 6 Population living as tenants below/above 60% median equivalised income**




**Source:** (Eurostat, 2014).

Split incentive problems are not limited to landlords and tenants only. They can also arise from incentives that function separately for different actors or different times, or if the time component does not affect the agents' decisions. A few examples are:

- Split incentives between building/housing constructors and operators, where the agent responsible for energy efficiency in the building is not the agent responsible for its operation. Builders may have little incentive to invest in energy efficiency if this is invisible in the buildings and if energy efficiency is not expected to be properly valued when buying/renting the building.
- Split incentives where the payback period for investing in energy efficiency is longer than the period the buyer intends or expects to own the asset.
- Split incentives of permanent investments attached to a house or apartment.

## 3.3. Conclusions

There are a number of barriers – behavioural, informational, economic and administrative – that prevent households from making energy efficiency improvements, even when doing so would make sense from an economic point of view.

Many barriers are expected to be more accentuated in the low-income household sector. The lack of savings and access to external capital are the most prominent barriers here. Low-income households are less creditworthy than average households.

Informational barriers may be aggravated by the low education levels sometimes present in low-income households. Informational barriers lead to market failure if market participants do not have sufficient and adequate information to make their own decisions about the economically most beneficial level of energy efficiency. In these cases, public policy intervention is required for markets to work.

If informational barriers are removed, information about the benefits of energy efficiency reaches the targeted low-income households. This is of paramount importance because having the right information helps people to overcome other barriers such as behavioural and economic obstacles.

The split incentives (landlord-tenant) barrier is complex. There is a clear tendency for people with low income to live as tenants. Large energy efficiency investments such as thermal refurbishments are expensive, and often beyond the reach of people with low incomes, even if they stand to benefit economically from the long-term energy and money savings. The split incentives barrier makes the investment unattractive to the landlord, and ultimately prevents these investments from being made. The split incentives barrier is therefore one of the most limiting and difficult to handle barriers. Approaches to deal with the split incentives barrier include, using an investment model in which a longer time for the investment to pay off is considered (see example of the housing association Bo-Ex in Box 3, section 4.3.1.c), financing the investment with the resulting savings via the energy bill for example, or by requiring that social housing (usually addressed to low-income people) only rents dwellings with pre-established minimum energy performance standards. Less creative ways to deal with this barrier is the direct subsidy to the tenant for making the improvements (see case study on New Zealand Warmer Homes program in section 4.6.2). Lower cost measures such as replacing inefficient appliances are not affected by the landlord-tenant dilemma as long as the owner of the new appliances is also the person paying the energy bills.

# 4. POLICY ASSESSMENT

**KEY FINDINGS**

- The EU policy framework considers the need for energy efficiency policies combined with social policies addressing energy consumption in low-income households to fight energy poverty. But it does not prescribe how these measures should be integrated into specific EU and Member State regulations, or how to ensure that all households are reached. Finding the right balance between energy efficiency and social policies is the challenge to combating energy poverty effectively.
- The lack of adequate and common EU definitions of energy poverty and vulnerable consumers is a barrier.
- Energy efficiency policies aim at structural improvements and take time to have effects. Social policies offer the rapid alleviation of energy poverty effects, but do not remove barriers to energy efficiency. Social policies, such as tolerance for non-payment of energy bills, direct payments, reduced tariffs and social security payments are present in almost every Member State, while energy efficiency policies for households are not implemented to the same extent.
- Energy efficiency policies specifically targeting low-income households have positive social impacts and are able to deliver the multiple benefits of energy efficiency. However, there are only a limited number of such policies in EU Member States.
- Energy audits combined with financial instruments consisting of loans and grants for building renovations are the most widely established measures in Europe and abroad to promote energy efficiency in low-income households. Information policies and appliance replacement policies are also used, but to lesser extent.
- All these programmes have in common that they provide grants earmarked for measures such as wall and roofs insulation and boiler replacements. Multiple benefits, such as higher comfort levels and recognisable health benefits, are rapidly recognised by beneficiaries of these programmes.
- None of the identified policies sufficiently addresses the split-incentives barrier, other than by providing a direct subsidy.

## 4.1. EU framework

### 4.1.1. Energy Union Package

Protecting vulnerable consumers and tackling energy poverty are policy objectives included in the European Commission's Communication on the Energy Union Package (EC, 2015a). These policy objectives are relevant to the overall EU goal of giving secure, sustainable, competitive and affordable energy to consumers. In order to reach these objectives, the Energy Union focuses on five mutually supportive pillars:

1. Energy security, solidarity and trust;
2. A fully integrated European energy market;
3. Energy efficiency contributing to moderation of demand;
4. De-carbonising the economy;
5. Research, innovation and competitiveness.

Pillar 3, 'energy efficiency', is the most important cornerstone of Europe's overarching strategy as energy efficiency improvements provide the most cost-effective solutions for achieving the Energy Union's objectives. In addition, there is increasing evidence that energy

efficiency will lead to numerous wider benefits for the economy, consumers and society such as positive effects on public budgets and the energy system (e.g. grid stability, reduced network losses, reduced costs for system upgrades) and improved local air quality.

The Energy Union mentions that energy poverty results from inefficient homes and a housing tenure system that fails to encourage energy efficiency. The Energy Union also includes provisions on further integration and liberalisation of the energy market. While economic efficiency is desirable, free markets may not always lead to the best outcome for low-income households (EC, 2015a). Therefore, the Energy Union implicitly recognises that a combination of policies in the social field, energy efficiency improvements, reduction of energy consumption, and participation in demand response programmes are key tools to address energy poverty. Under the new Energy Union legislative framework, the Commission's aim is to make it easier to finance energy efficiency improvements through European Structural and Investment Funds. These financing options are expected to also benefit social housing and low-income households. The future recast of the Energy Efficiency Directive (EED) and Energy Performance of Buildings Directive (EPBD) could work in the same direction by ensuring Member States allocate a percentage of funding to energy efficiency refurbishments in low-income households. They could also set incentives to earmark more EU funds for renovation programmes focused on fighting energy poverty.

### 4.1.2. The Electricity and Gas Directives

Energy poverty is explicitly mentioned in the Electricity and Gas Directives (2009/72/EC and 2009/73/EC). Art. 7 of the Electricity Directive and Art. 3 of the Gas Directive require that EU Member States *'develop national action plans or other appropriate frameworks to tackle energy poverty'* and define and protect *'vulnerable customers'* (EC, 2009a). Providing energy efficiency improvements, prohibiting the disconnection of gas and electricity during critical periods and giving other social benefits to tackle energy poverty are measures that can be used by EU Member States to comply with these objectives (EP, 2016a). The type of policies and the definition of vulnerable customers are to be decided by the Member States.

### 4.1.3. Energy Efficiency Directive

The main provisions established by the Energy Efficiency Directive (2012/27/EU) stipulate that Member States should:

- Establish targets for energy efficiency to be achieved by 2020;
- Develop long-term strategies to promote investment in building renovation;
- Annually renovate 3 percent of the surface area of government buildings, so the state plays an exemplary role and public bodies are encouraged to set up National Buildings Registries;
- Establish an energy efficiency obligation (EEO) scheme, which must ensure that the designated obligated parties achieve cumulated energy savings that reach the specified target by 31 December 2020;
- Prepare National Energy Efficiency Action Plans every three years;
- Assess their potential for cogeneration and centralised district heating;
- Promote the energy service market, and access by SMEs to this market;
- Monitor and report how the provisions of the Directive are implemented.

The topic of energy poverty in low-income households is directly included by specifying energy obligations. Art. 7 of the Directive establishes an annual energy savings target of 1.5 percent of national energy sales through energy efficiency obligation schemes or alternative policies, and art. 7(7)(a) states that these obligation schemes may *'include requirements*

*with a social aim in the saving obligations they impose, including by requiring a share of energy efficiency measures to be implemented as a priority in households affected by energy poverty or in social housing.'* (EC, 2012). This allows Member States to require that vulnerable customers benefit from efforts within EEOs.

Energy poverty is also included indirectly in the requirement to define national long-term strategies. Article 4 of the EED calls for Member States to establish a long-term strategy (beyond 2020) for mobilising investments in the renovation of residential and commercial buildings and improving their energy performance. This article states that this *"strategy should address cost effective deep renovations which lead to a refurbishment that reduces both the delivered and the final energy consumption of a building by a significant percentage compared with the pre-renovation levels leading to a very high energy performance."* (EC, 2012). The investments mobilised by Member States strategies can decisively help prevent energy poverty if priority is placed on improvements for energy-poor households.

The Public Consultation held in the context of the proposed revision of the EED includes one question focusing on vulnerable customers, namely whether EEOs should have specific rules for vulnerable consumers.

The responses were divided: 35 percent of respondents were in favour of such rules, 35 percent opposed and 30 percent voiced no opinion. Those in favour called attention to the benefits that reduced energy costs can have for low-income households. Some argued that expenditure on energy per household would be regressive, as these households would have to spend a larger proportion of their income on energy. This regression could be mitigated, for example, through subsidised energy efficiency measures. Arguments against the specific rules included that EEOs should not discriminate between different types of consumers, but should aim to reduce energy consumption for all. Furthermore, several respondents shared the view that energy poverty should be addressed by welfare policies, not energy policies, enacted at Member State level. Finally, arguments were made that Member States define 'vulnerable consumers' differently, which is why it would lead to additional confusion if EEOs were to address them. (EC, 2016a).

### 4.1.4. Energy Performance of Buildings Directive

The Energy Performance of Buildings Directive (recast 2010/31/EU) says in its preamble that Member States shall encourage investments and that measures to improve the energy efficiency of buildings could potentially help reduce energy poverty. No other mentions of energy poverty or vulnerable consumers are made in the Directive.

With regard to the energy efficiency retrofitting of existing residential and public buildings, the most significant parts of the EPBD state that:

- Measures to improve the energy performance of buildings should take into consideration local conditions as well as cost-effectiveness, and should not affect accessibility, safety and the intended use of the building;
- Member States have the sole responsibility for setting minimum requirements for the energy performance of buildings and building elements, and that requirements should ensure cost-optimality over the lifecycle of the building;
- The Commission defines a methodology framework for calculating cost-optimal levels of minimum energy performance requirements, and Member States should use this framework to compare the results with the minimum energy performance requirements which they have adopted;
- A "major renovation" is defined either as one which costs more than 25 percent of the building's value, or which involves more than 25 percent of the surface of the building's envelope;

- Member States are required to use cost-optimality calculations to set levels of minimum energy performance requirements, along with other relevant parameters;
- Member States are required to ensure that the same minimum energy performance requirements are applied when buildings undergo major renovation, in so far as this is technically, functionally and economically feasible;
- All new buildings must be nearly zero energy buildings by the end of 2020 (public buildings by the end of 2018 already).

The Public Consultation (EC, 2015c) held in view of the proposed revision of the EPBD shows that several Member States have implemented programmes to improve the energy performance of low-income households. But these programmes mostly remain stand-alone instruments and are not integrated into broader national or EU strategies. Most requirements for new construction and renovations refer to energy and environment-related aspects rather than social aspects. Respondents were divided on whether further measures tackling energy poverty should have been included in the EPBD. A slight majority acknowledges the opportunities the EPBD presents to also tackle energy poverty, while others believe fuel poverty may fit better into the EED than the EPBD. There is also some agreement among respondents to include a definition of energy poverty in the EPBD and to encourage Member States to better integrate national long-term health, energy poverty and building renovation strategies and respective funding schemes (EC, 2015c).

### 4.1.5. Other Directives, Funds and developments

European Structural and Investment Funds could be deployed to ensure that the clean energy transition is fair, in particular with vulnerable members of society negatively affected by the transition (EC, 2016b). The following funds are relevant:

- The Cohesion Fund (CF), which aims to reduce economic and social disparities and to promote sustainable development in the lower-income EU Member States. Supporting energy efficiency and smart energy management in public buildings and in the housing sector is one of the priority areas of the Cohesion Fund;
- The European Regional Development Fund (ERDF), which aims to strengthen economic and social cohesion in the European Union by correcting imbalances between its regions. Many cross-border energy efficiency projects have been funded by the ERDF. The high attention for alleviating social imbalance makes the ERDF well suited for targeting energy poverty in low-income households. The Cohesion Fund and the ERDF have allocated already € 5.2 billion for energy efficiency investments in housing (EC, 2016b). These two Funds will invest € 17 billion in energy efficiency in public and residential buildings and in enterprises, with a focus on SMEs over the period 2014-2020. This will be complemented by national public and private co-financing, reaching an estimated total of some EUR 27 billion (EC, 2016b);
- The European Social Fund (ESF), which aims to improve the situation of the most vulnerable people at risk of poverty. One of the four priority areas of this Fund is promoting social inclusion and combating poverty. Although activities in this priority area are more directed towards employment, combating energy poverty could also be addressed by this Fund. At least € 1.1 billion will be dedicated to improving education and training systems necessary for the adaptation of skills and qualifications and for the creation of new jobs in sectors related to energy and the environment in the period 2014 – 2020 (EC, 2016b).
- A number of Member States have chosen to target social housing and households in need with these European Structural and Investment Funds. Building upon these financing possibilities, the Commission is adopting the "Smart Finance for Smart

Buildings" initiative to unlock an additional € 10 billion of public and private funds until 2020 for energy efficiency and renewable energies and to better target subsidies towards vulnerable consumers (EC, 2016b). This initiative aims to enable more effective use of European Structural and Investment Funds in combination with funding through the European Fund for Strategic Investments (EFSI).

- The EFSI is a cornerstone in mobilising private financing for energy efficiency and small scale renewables in buildings. The EFSI aims to overcome current market failures by addressing market gaps and mobilising private investments. The vast majority of energy projects approved for financing under this fund (which equal to 23% of the overall €116 billion in total investment) concern energy efficiency and the renewable energy sector. The EFSI has for example provided a € 100M loan to a public-private developer to renovate thousands of condominiums in the Paris region, reaching a reduction in energy use between 40 and 75 percent (EC 2016b);

Several other Directives and policies have more indirect relevance for addressing issues of energy poverty and vulnerable consumers. The most relevant upcoming changes in the energy and climate policy environment in relation to energy poverty are:

- The reform of the EU ETS. Several aspects in this reform (such as the increase of the cap reduction factor and the establishment of the MSR - Market Stability Reserve) may impact carbon market prices, which in turn may impact energy prices (especially electricity prices). With this reform, resources may be allocated to facilitate investments in modernising the energy systems and improve energy efficiency in lower income Member States;
- The proposed revision of the energy labelling directive. This will further enable energy consumers to make more informed choices that will help them save energy;
- The new deal for energy consumers. This combined package of suggestions to empower energy consumers may support free choice of energy supplier, help consumers save energy and increase the options for self-supply.

## 4.2. Classification of existing national and regional policies

The first level of classification relates to the field of application: energy efficiency policies (general policies or policies specifically targeting low-income households) and social policies addressing energy consumption in low-income households. Energy efficiency policies aim to remove barriers and incentivise investments in order to tap into the multiple benefits resulting from energy efficiency. Social policies addressing energy consumption aim to the rapid alleviation of the effects of energy poverty but do not address structural issues of energy efficiency (see also Figure 1).

Energy efficiency policies may target all households in general or they may specifically target low-income households either through a specific component or only focusing on this group. Sections 4.3, 4.4 and 4.5 will deal with general energy efficiency policies for households, energy efficiency policies targeting low-income households, and social policies addressing energy consumption in low-income households respectively.

In order to find a reasonable level of aggregation, all energy efficiency and social policies are classified by the policy instruments they use (see Table 2): Financial, fiscal, legislative, education/information and market-based (see e.g. UNFCCC, 2000 and MURE, 2016). Since these five policy instruments are still too broad for a detailed analysis, several policy topics are used to better reflect the heterogeneity of specific policies.

**Table 2 Classification of policies by policy instruments used**

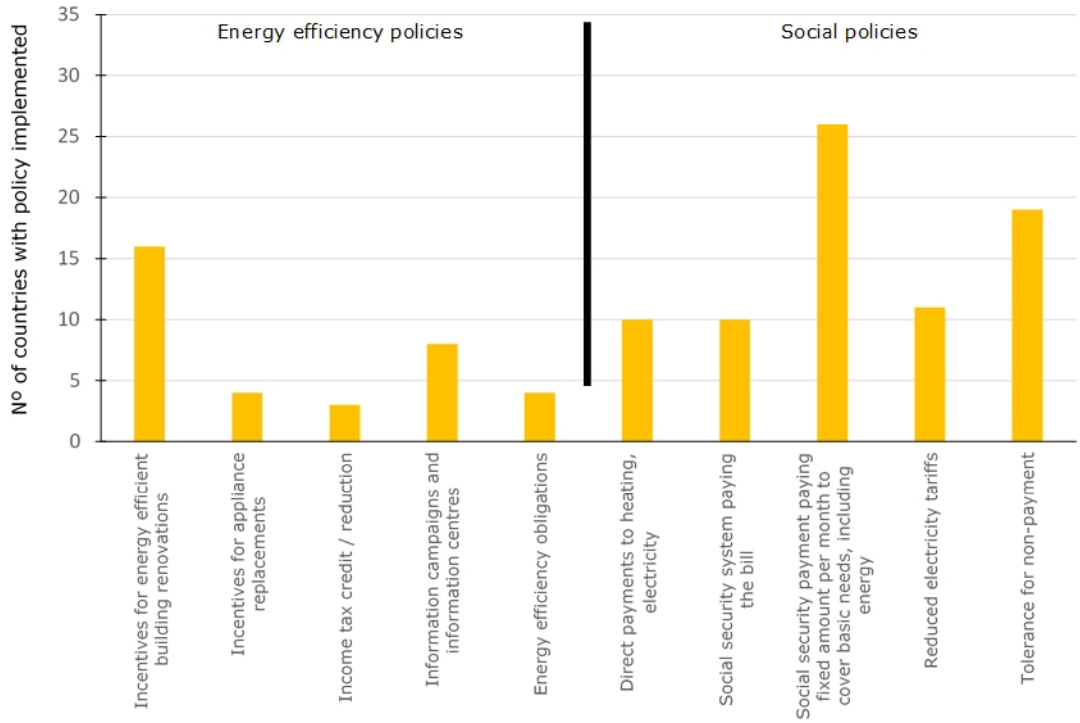
| Policy topic by instrument used | General energy efficiency policies | Energy efficiency policies for low-income households | Social policies addressing energy consumption |
|---|---|---|---|
| **Financial instruments** | | | |
| Energy audits | X | X | |
| Incentives promoting renewables | X | | |
| Incentives for energy-efficient building renovations | X | X | |
| Investments in new builds exceeding building regulations | X | | |
| Incentives for appliance replacement | | X | |
| Direct payments of heating and electricity | | | X |
| Social security system paying the bill | | | X |
| Social security paying fixed amount per month to cover basic needs, including energy | | | X |
| **Fiscal instruments** | | | |
| Income tax credits or reduction | X | X | |
| Reduced electricity tariffs | | | X |
| **Legislative instruments** | | | |
| Energy efficiency certificates for buildings | X | | |
| Energy performance standards for buildings | X | | |
| Energy performance standards for appliances | X | | |
| Energy labelling of household appliances | X | | |
| Smart metering and detailed energy billing | X | | |
| Tolerance for non-payment | | | X |
| **Informative/Education instruments** | | | |
| Information campaigns and information centres | X | X | |
| Voluntary labelling of buildings/ components | X | | |
| **Market based instruments** | | | |
| Energy efficiency obligations | X | X | |

**Source:** Authors, based on (UNFCCC, 2000 and MURE, 2016).

Social policies, such as tolerance for non-payment of energy bills, direct payments, reduced tariffs and social security payments are present in almost every EU Member State, while policies targeting energy efficiency are not implemented to the same extent. Figure 7 indicates the number of EU Member States that implements each type of policy. All Member States have implemented at least one policy approach to alleviate energy poverty. Moreover, the majority of Member States (26 out of 28) have established two or more policy measures

for dealing with this issue, while only two Member States have implemented just one. A large number of Member States (20 out of 28) have implemented energy efficiency measures targeting low-income households. All these Member States combine both energy efficiency and social policies in their fight against energy poverty. The rest of Member States focus their strategies on the rapid alleviation of energy poverty through social policies.

**Figure 7 Number of MS implementing different policies to fight energy poverty**




**Source:** Compiled from NEEAPs, national documents, (MURE database, 2016), (INSIGHT-E, 2015), (ACER, 2015).

## 4.3. General energy efficiency policies for households

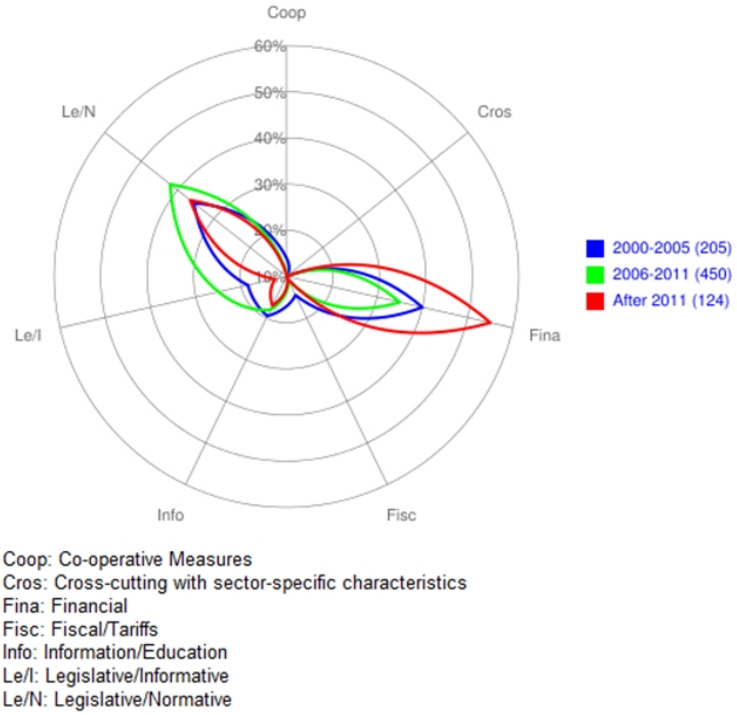
Existing general energy efficiency policies for the residential sector in the EU make use of financial, fiscal, legislative, informative and market based instruments. Specific policy topics using these instruments are described in sections 4.3.1 to 4.3.5. Every three years, Member States must submit their 'National Energy Efficiency Action Plans' (NEEAP) to the European Commission. NEEAPs describe the set of planned national energy efficiency measures intended to reach the targets set by the EED and the improvements that Member States expect to achieve. About 470 national and regional measures regarding energy efficiency and addressing households in general have been implemented in EU Member States and Norway since the year 2000 (MURE database, 2016). Many of these measures correspond to the implementation of the EU Directives presented in section 4.1. The third and latest NEEAPs were submitted by Member States by June 2014. Energy efficiency measures included in the NEEAPs are collected in the MURE[12] database, which at present contains 228 measures.

Figure 8 shows the evolution in percentage shares of the different policy instruments used in the policy mix of all Member States plus Norway for three periods: 2000-2005, 2006-2011 and 2011-2016. In the period after 2011, there was a switch to more than 50 percent financial measures (i.e. grants, subsidies and loans) and about 35 percent legislative ones

[12] The ODYSSEE-MURE project gathers representatives from the 28 EU Member States plus Norway and Switzerland. It aims at monitoring energy efficiency trends (ODYSSEE) and energy efficiency measures in Europe (MURE): http://www.odyssee-mure.eu/

(e.g. minimum performance standards). The first period (2000-2005) had a slightly higher share of legislative (e.g. mandatory labelling) and informative measures, while the period 2006–2011 tended to focus on legislative measures.

**Figure 8 Measures introduced by type of policy instrument and time period**




**Source:** (MURE database, 2016).

**Error! Reference source not found.** in Annex 3 presents an overview of the environmental, economic and social impacts on households resulting from the implementation of all general efficiency policies included in the MURE database[13] and further review of national documents such as NEEAPs and other national policy evaluations.

### 4.3.1. Financial

#### a. Energy audits

This type of measure provides subsidies for energy audits in households, which are often carried out in preparation to energy efficiency-related renovations or the replacement of household appliances. The advice is often based on an on-site inspection of the building or household and may also result in an official energy label. These measures usually target house and flat owners but also tenants, because the lack of knowledge about their own energy consumption and saving options hinders them from investing in energy efficiency improvements or changing their behaviour to reduce consumption. Audits might target different groups, including low-income households. Best policy examples are:

- *BAFA Onsite Consultancy (DE):* On-site consultation with a qualified energy advisor leading to complementary recommended measures that (even with gradual renovation) results in the building being regarded as permanently renovated in terms of energy savings in keeping with the efficiency principle is eligible for support from the Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA) (BMWi, 2014). The program financial volume was approx. €4.5 million in 2013 (6,961 consultations),

[13] General energy efficiency policies for households implemented after year 2000 in the EU plus Norway

€3.1 million in 2014 (7,075 consultations) and €5 million in 2015 (10,274 consultations). The yearly new energy savings attributable to the program are 0.1794 Mtoe (BAFA, 2016 and Prognos, 2013).

- «*Maatwerkadvies Meer met Minder*» *(NL):* Customised advice provides a household-specific report of the energy-saving measures that can be implemented, how much they cost and what they will deliver. The advice is based on an on-site inspection of the house and results in an official energy label. The customised advice cost in the range of €200-450 (depending on the size of the house). Total funds of around €13 million were available for the subsidy scheme in 2009 and 2010. These funds were fully allocated by the end of 2010 (Ministerie van BZK, 2011).

*Benefits and impacts on low-income households*

The investments as part of energy audits are expected to have a medium impact on the overall economy. The social impact on low-income households is rated as only slightly positive because low-income households may benefit from the behavioural changes recommended by audits, but they lack the capital to make the more financially substantial advised investments. Nonetheless smaller investments like small energy efficient appliances can still have a significant overall impact.

### b. Incentives for promoting renewables

Measures of this type mostly provide some kind of subsidy, grant or soft loan to private households to replace conventional heating systems with renewable ones like solar thermal or heat pumps. These financial measures are often combined with energy efficient renovation measures such as thermal insulation. Best policy examples are:

- «*Sanierungscheck*» *(AT):* Private households receive subsidies for insulating outer walls, ceilings, replacing windows and doors and switching conventional heating systems to renewable ones if the building is older than 20 years. Additional subsidies are foreseen for insulation based on regenerative natural resources and to issue energy performance certificates. Businesses also receive subsidies for optimising the thermal insulation. Additional subsidies are foreseen for combining this measure with the optimisation of the technical systems. In 2013, 24,028 renovation projects were supported and triggered investments of €847 million. The average subsidy amounted to approximately €4,900 (BMWFJ, 2011).
- «*Marktanreizprogramm für erneuerbare Energien im Wärmemarkt– MAP*» *(DE):* The Market Incentive Programme for Renewable Energies (Marktanreizprogramm-MAP) was first introduced in September 1999. It supports the use of renewable energy sources in existing buildings (residential and non-residential). As part of the German government's Integrated Energy and Climate Programme, the BMU (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety) decided on a new open-ended directive for the MAP, which came into effect in January 2008. The financial volume was increased from €213 million in 2007 to €350 million in 2008 and €500 million in 2009 (BMWi, 2014).
- «*Special programme for climate change*» *(LT):* This programme supports different renovation and replacement measures (e.g. insulation, replacement of renewable heat supply). This programme consists of the sub-programmes "Modernisation of living houses" and "Use of renewable energy sources in individual living houses" (ENMIN, 2014).

*Benefits and impacts on low-income households*

The usual target group of this type of policies is homeowners. The social impact on low-income households is negative because people with low income in most Member States are less likely to be homeowners (see Figure 5), and thus are less likely to benefit from incentives promoting renewables. Furthermore, they are more strongly affected by the indirect cost of renewables in electricity prices, e.g. through reallocation charges.

### c. Incentives for energy efficient building renovations

These incentives usually promote the comprehensive renovation of buildings, including alterations to the building envelope, technical, electrical and water supply systems. Best policy examples are:

- *«$CO_2$-Gebäudesanierungsprogramm» (DE):* The measure aims to promote energy-related building renovations and includes increased funding of up to € 200 million per year for KfW building renovation programmes (BMWi, 2014).
- *«Better Energy Homes» (IE):* The programme aims to stimulate energy-efficiency actions to reduce energy use by homeowners and the general public. The Sustainable Energy Authority of Ireland (SEAI) grants aid to householders that want to make their homes more energy-efficient. Incentives are for attic and wall insulation and heating control with efficient boilers. Funding for energy efficiency improvements is provided to households experiencing fuel poverty (DCCAE, 2014).
- *«Home Energy Efficiency Programme Scotland» (UK):* The Home Energy Efficiency Programme for Scotland (HEEPS) is the Scottish government's initiative to tackle fuel poverty and increase energy efficiency in households. It offers energy efficiency advice, information on low cost energy tariffs, and advice on income maximisation. The programme was launched in April 2013 to take over from the Energy Assistance Package, Universal Home Insulation Scheme and Boiler Scrappage Scheme (DECC, 2014).

*Benefits and impacts on low-income households*

The general economic impact of this measure on society is rated as high due to the relatively large investments directly stimulating employment in economic sectors like construction. The increase in employment indirectly benefits low-income households. However, unless low-income households are specifically targeted, the impacts of this measure on them is not relevant. The reason is that the target group of this measure is mostly homeowners, while low-income households are often tenants. Tenants may be even indirectly burdened by higher rents as the investments are usually apportioned to the rent and the increased rent tend to outweigh any savings made in the energy bill.

**Box 3: Renovation of post-World War II houses from E/F/G label to A or B label**

**The experience of Bo-Ex renovating buildings without raising rent (removing the split incentives barrier)**

Bo-Ex has a policy that is unique in the Netherlands: they renovate post-World War II houses from E/F/G label to A or B label without raising the rent for the current tenants. Only when a mutation occurs, the rent for the new tenant is increased to the level required to recover the investment. This model means that it will take longer for the investment to pay off for the housing association. But the benefits are that Bo-Ex avoids the regulation that at least 70% of the tenants in a building must agree with a raise of the rent, avoids delays because of time-consuming (and money-consuming) protests and discussions with the remaining tenants, and because the houses can still be exploited for a long time. The advantages, in their experience, are worth the extra investment. This model may be interesting for

consideration in other countries, and may also be supported by authorities and/or underlying financial institutions for housing associations.

The main barriers are in the mechanics involved in financing the investments: the discount rate they have to use, the rules for valuation of their housing stock, the interest coverage rate rules. Changes in these rules strongly affect their ability to operate. Recently, the discount rate was lowered which means that they at once have more options to finance energy renovations.

The policy not to raise rents will not work when renovating to net-zero energy, because the investment is too high for that model. In the Netherlands, recently an Energy Performance Compensation facility was introduced that allows landlords to raise the rent for near net-zero renovations. Bo-Ex until now has no experience with that facility, as net-zero renovations are still challenging with regard to finances and regulations.

The main barrier is uncertainties in regulations (mainly national) on the long term. In the Netherlands, policies and regulations have changed much in the past years, which makes it hard for housing associations to make long-term investments. An additional example concerns placing solar power panels on social houses: their cost-effectiveness is uncertain because in the Netherlands, the future of the current arrangement of net-metering is uncertain. Again here, long-term stability would be the best strategy to help investments.

### d. Investment in new buildings exceeding building regulations

Either loans or investment grants are offered to promote energy-efficient construction. Energy standards are set for new buildings and new homes with lower energy consumption are eligible for financing. Such energy-efficient homes require innovative heating technology based on renewable energies (such as solar thermal, biomass or heat pumps) and high-grade thermal insulation and are made more attractive to building owners due to the financial support. Best policy examples are:

- «*Prêt à taux zéro (PTZ)*» *(FR):* The new Zero-Rated Loan (PTZ+) was introduced in 2011 under the draft Finance Law. It aims to help people purchase their first residence, which complies with the thermal regulation RT 2012 or qualifies for the label "low consumption building". Since January 2012, the PTZ+ is reserved for the construction or purchase of a new home. However, it is possible, under certain circumstances, to use a PTZ + to acquire an older property within the framework of selling off social housing to its occupants (MEDDE, 2014).
- «*Energieeffizientes Bauen*» *(DE):* The KfW bank offers either a loan or an investment grant to promote energy-efficient construction in both equity and debt financing. Energy standards for new buildings are set in the Energy Conservation Ordinance (EnEV). The KfW programme helps to finance homes that consume less energy than stipulated in this ordinance. Such energy-efficient homes require innovative heating technology based on renewable energies (such as solar, geothermal, biomass, wood, wind, hydro power) and very good thermal insulation (BMWi, 2014). The programme reached 262,000 units in 2011 when the financial volume of the year amounted to €952 million. The yearly new energy savings attributable to the program are 0.1326 Mtoe (IWU, 2013).

#### *Benefits and impacts on low-income households*

The social impact on low-income households is assumed to be none due to the low proportion of low-income homeowners in most Member States, and their lack of capital for investments exceeding building regulations.

### 4.3.2. Fiscal

#### a. Income tax credit/reduction

Tax credits of varying amounts are applied to the purchase price of equipment like energy efficient boilers and thermal insulation materials, usually excluding installation costs. In other cases, the interest paid on loans for renovating homes are income tax-free. Best policy examples are:

- «*Eesti eluasemevaldkonna arengukava*» *(EE):* The National Development Plan for Housing Sector 2008–2013 (Eesti eluasemevaldkonna arengukava 2008–2013) approved by the government in January 2008 is the general basis for supporting renovation of pre-1990 residential buildings and is implemented by the Ministry of Economic Affairs and Communications (MoEAC) and the Foundation KredEx, which provides loan security for apartment unions on loans that will be used for repair or renovation. The attainability and affordability of housing loans has been significantly improved by the income tax exemption on the accrued interest of housing loans (MKM, 2014).
- «*Crédit d'Impôt Transition Energétique (CITE)*» *(FR):* The Crédit d'Impôt Transition Energétique supports landlords or leaseholders who pay taxes in France for purchasing efficient materials and equipment to limit energy consumption and greenhouse gas emissions by applying a tax credit of 30 percent when implementations are carried out by certified enterprises (MEDDE, 2014).

*Benefits and impacts on low-income households*

Economic impacts are rated only low as the taxes saved are usually only partially reinvested, thus counteracting the stimulating effects of investments in energy efficiency. The social impact of tax reductions is rated as none because low-income houses usually do not pay a significant amount of income tax, so they are not able to benefit from income tax reductions. However, tax credits for energy efficiency investments may benefit low-income households even when they pay no or little income taxes. This is the case because tax credits are refundable when they exceed tax liability.

### 4.3.3. Legislative

#### a. Mandatory energy efficiency certificates for buildings

In the frame of the Energy Performance of Buildings Directive, Member States implemented obligations for energy certification in case of buying or renting houses. These certificates should be presented within a limited time period to the buyer or tenant and should not be older than a certain age. This procedure usually differs for new and older buildings. This measure targets home buyers and tenants. It is intended to promote energy efficient dwellings. It incentivises building owners to undertake renovations to lower the energy consumption, or to build more energy efficient homes as the demand for these rises. Best policy examples are:

- «*CER (Energy Performance Certificate for Buildings)*» *(ES):* This measure requires certain new builds and older buildings to obtain an energy efficiency certificate: The buildings affected include public buildings or units of existing buildings with a floor area over 250 m² or privately owned buildings over 500 m² floor area (IDEA, 2011).
- «*Diagnostic de performance énergétique (DPE)*» *(FR):* The energy performance diagnosis (DPE in French) aims to provide information on the energy performance of a building by evaluating its energy consumption and its impact in terms of greenhouse gas emissions. It also includes technical recommendations which give the purchaser,

the owner or the tenant information about the most effective measures to implement in order to save energy: general good practices and behaviour but also works that could be done (ADEME, 2014).

*Benefits and impacts on low-income households*

While this might have a medium economic impact due to required additional investments, the social impact is rated as none to slightly positive because low-income households are usually not able to afford to rent dwellings in highly rated buildings. Low-income households could benefit from this policy measure when such certification triggers renovations in buildings or dwellings with particularly high specific energy consumption.

### b. Energy performance standards (buildings)

According to Article 2 of the Energy Performance of Buildings Directive, a "nearly-zero energy building" is defined as a building with a very high energy efficiency level, which is to be determined according to a "common general framework calculation for buildings" (Annex I of the Directive). The nearly zero or very low energy consumption should be largely covered by energy from renewable energy sources produced in the building or its surroundings. Article 9 of this Directive states the terms: After 2020, all new buildings will be nearly-zero energy buildings; and after 2018, the new buildings that are occupied and belong to public authorities will be nearly-zero energy buildings. Member States devise national policies and adopt suitable measures such as the establishment of objectives following the example of the public sector to stimulate the transformation of buildings into nearly-zero energy ones. Best policy examples are:

- «*Energieeinsparverordnung – EnEV*» *(DE):* The Energy Saving Ordinance (EnEV) states minimum requirements for the energy quality of the building envelope, systems engineering for new buildings and major renovations of existing buildings. The last revision in 2013 raised requirements regarding the yearly primary energy consumption of new buildings by 25 percent, the requirements for building insulation by 20 percent, and included the replacement of heating boilers built before 1985 (BMWi, 2014).
- «*Réglementation thermique (RT) 2012*» *(FR):* The implementation of RT2012 strengthens the requirements concerning the thermal performance of new buildings: all new buildings with a building permit lodged after January 2013 must have primary energy consumption below a threshold of 50 kWh/m²/year on average (energy performance level equivalent to the 'low consumption building' level of labels under RT2005) (MEDDTL, 2011).

*Benefits and impacts on low-income households*

The social impact is assumed to be slightly negative as the additional investment costs (e.g. up to 20% compared to a cost optimal case for NZEB (Kurnitski et al., 2011)) for the construction of residential buildings meeting certain energy efficiency standards might be usually reflected in higher rents, which make it more difficult for the low-income population to benefit from lower energy costs and health benefits.

### c. Energy performance standards (appliances)

The "Ecodesign Directive" created a framework for an ecological design of products related to energy. It aims to harmonise national measures and administrative measures of Member States. The Directive sets standards for maximum energy consumption for several types of widely used household appliances and thus targets tenants as well as homeowners. Best policy example is:

- «*Energiebetriebene-Produkte-Gesetz – EBPG*» *(DE):* The German law implementation of the revised EU Eco-design Directive (2009/125/EC) introduces measures setting minimum requirements for appliances in private households (BMWi, 2014).

*Benefits and impacts on low-income households*

While the economic impacts are rated as medium, the social impacts on low-income households are assumed to be neutral as these impacts depend on having the necessary funds to invest in replacing their appliances with energy efficient ones.

### d. Energy labelling of household appliances

The Energy Labelling Directive (EC, 2010) created different labelling requirements for individual products. Currently, several different energy scales exist (from A to G, A+++ to D, etc.), but energy efficiency has improved so much since the label was first introduced that most of the products now on the market are in the top energy efficiency class. Thus, in July 2015, the Commission proposed the return to a single A to G scale to help consumers distinguish the most efficient products of today more easily and facilitate the decision to invest in more energy efficient appliances. Best policy example is:

- «*Energieverbrauchskennzeichnungsverordnung*» *(DE):* The Energy Consumption Labelling Ordinance (EnVKV) passed by the Federal Ministry of Economics implements the EU's Energy Labelling Directive 2010/30/EU.

*Benefits and impacts on low-income households*

As appliances in highly rated energy classes are usually more expensive, low-income households might be unable to afford these energy saving options regardless of the additional information these labels provide. However, energy labels might help low-income households to avoid purchasing particularly inefficient appliances. Thus the social impact of this policy topic is rated as neutral.

### e. Smart metering and detailed energy billing

Providing detailed and more frequent data on energy consumption (due to the technological features of smart metering and/or detailed energy billing) is a suitable way to provide the necessary information for behavioural changes or to identify appliances with high specific energy consumption. Best policy examples are:

- «*Uitrol slimme meters*» *(NL):* In 2010 it was expected that the energy consumption in households could be reduced by up to 6.4 percent for electricity and 5.1 percent for natural gas depending on the feedback methods. Thus, in 2012, the Ministry of Economic Affairs started the roll-out of smart meters. By December 2013, about 600,000 smart meters had been installed. In March 2014, the Minister of Economic Affairs decided that the large-scale roll-out of smart meters would start on 1 January 2015 (Agentschap NL, 2012).
- «*Smart metering and Billing* » (UK): The Department of Energy and Climate Change (DECC) is leading the roll-out of smart meters with support from an industry regulator. DECC estimated that over the next 20 years the installation of smart meters will provide £6.7 billion net benefits to the UK: the programme will cost £12.1 billion and provide £18.6 billion in benefits. The roll-out will involve visiting 30 million homes and replacing 53 million domestic gas and electricity meters. DECC established the Smart Meter Implementation Programme to set the policy framework, revise the regulatory framework including updating consumer protections, and ensure the necessary cross-industry arrangements are in place (DECC, 2011).

*Benefits and impacts on low-income households*

As the additional information offered by smart meters or more detailed energy billing is not assumed to trigger particularly large investments, its economic impact is considered to be relatively low. Furthermore, reduced energy costs due to smart metering are often overcompensated by the costs of installation and operation, which leads to a slightly negative rating of the social impact on low-income households.

### 4.3.4. Informative/education

#### a. Information campaigns and information centres

The main aim of information campaigns and information centres is to raise awareness about energy saving possibilities and energy cost reduction potentials. This might be done by distributing information material such as leaflets or brochures, or by giving seminars addressed to target groups on rational energy use and behaviour. The target groups of these informational measures are workmen, contractors, architects, engineers and builders within the building industry or house-owners and tenants. Best policy examples are:

- «*BedreBolig*» *(DK):* BedreBolig (Better Home) is a scheme of the Danish Energy Agency focusing on the energy renovation of private homes and aiming to make this easier for homeowners to do. Professionals like architects, engineers, workmen, energy consultants and building designers are trained as energy advisors for homeowners. In connection with the launch of BedreBolig, DKK 15 million have been allocated to launching a special information campaign (ENS, 2014).
- «*Top Runner Strategy*» (DE): In order to increase the energy efficiency of electrical appliances, the German government favours a "Top Runner Strategy" following the Japanese example, which is supported by intensive information and motivational measures for final consumption and the retail trade. The approach is designed to promote the development and market penetration of products with high levels of energy efficiency and, at the same time, to define certain minimum energy efficiency standards as a prerequisite for market introduction (BMWi, 2010).

*Benefits and impacts on low-income households*

The direct economic impacts of these measures are considered to be relatively low. However, the social impact is rated as positive because these measures also promote behavioural changes to reduce energy consumption, which provide energy savings at no-cost and thus benefit low-income households as well.

#### b. Voluntary labelling of buildings / components (existent and new)

Measures regarding the voluntary labelling of buildings or components like heating systems aim to promote more stringent performance standards. Special labels are intended to certify particularly low specific energy consumption in new, existing and renovated buildings. The certification often includes consulting prior to the planned renovations or construction. Best policy examples are

- «*Label haute performance énergétique (HPE)*» *(FR):* Five voluntary "high energy performance" (HPE) labels have been created to highlight buildings with a better energy performance than required by the thermal building regulation RT 2005. The energy performance levels of these labels depend on the building's energy consumption and the ratio of energy from renewable energy sources and/or heat pumps (JORF, 2009).
- «*klima:aktiv building*» *(AT):* Klimaaktiv is the Austrian climate protection initiative launched by the Federal Ministry of Agriculture, Forestry, Environment and Water

Management and part of Austria's climate strategy. Klimaaktiv in the building sector aims to promote ecological, energy efficient new buildings, as well as initiatives for retrofitting old buildings by establishing a new building standard. The klimaaktiv building standard exists for residential and office buildings, new buildings and renovations (BMWFW, 2014).

*Benefits and impacts on low-income households*

Since these voluntary labels mostly target homeowners or home-builders, the benefits for low-income households are not expected to be relevant and thus this policy topic is rated neutral regarding its social impact. The economic impact is rated as rather low because this measure is not expected to stimulate exceptional investments.

#### 4.3.5. Market-based

**a. Energy Efficiency Obligations Schemes (EEOs)**

The principle of EEOs is to oblige suppliers (or other "obliged entities") to deliver a set amount of energy savings in homes. This is achieved by incentivising energy consumers, i.e. private households and companies, to install energy efficiency measures by providing subsidies. Article 7 of the EED requires Member States to introduce energy efficiency obligation schemes. Under these schemes, energy companies must fund energy efficiency projects with 1.5 percent of their annual energy sales. However, Article 7 also offers EU Member States the option to introduce alternative policy measures, provided that these measures deliver equivalent energy savings[14]. Best policy example is:

- «*Supplier Obligations – Energy Company Obligation (ECO)*» *(UK):* For this scheme, which does not cover businesses or industrial end-users, the national energy regulator (OFGEM) defines individual savings targets for each energy supplier and checks whether the obligated companies achieve them. The energy suppliers choose different ways of delivering the savings including subcontracting work to installers, managing agents, working with municipalities or carrying out the work themselves. The scheme includes a carbon saving communities obligation (CSCO) focused on the delivery of 'carbon reduction' measures to the 15 percent most deprived areas and eligible rural households, and an affordable warmth (AF) obligation requiring a defined reduction in energy costs in low-income households (DECC, 2012).

*Benefits and impacts on low-income households*

As these obligations usually lack a so called "ring-fencing" requirement, energy efficiency installations may only take place in households that are able to contribute most to the cost of these measures. This results in an additional financial burden on low-income households, as such households help to pay for the measures through energy prices, but do not benefit from them. Thus the social impact of general EEOs that do not specifically address low-income households is rated as negative. The social impact will be different for EEOs with a specific component for low-income households (see section 4.4.4).

### 4.4. Energy efficiency policies targeting low-income households

Policies described in section 4.3 address energy efficiency policies for households in general. This section describes existing energy efficiency policies specifically targeting low-income households in the EU. These policies use financial, fiscal, informative and market-based

[14] For detailed information on EEOs and the implementation of Article 7 EED in the Member States see Bertoldi et al. 2010 and 2015, Lees 2012, Staniaszek and Lees 2012, RAP 2012, Lees and Bayer 2016 and the EU project ENSPOL.

instruments as described in sections 4.4.1 to 4.4.4. Financial instruments consisting of loans and grants for building renovations are the most widely established measures to promote energy efficiency in low-income households. Information policies and appliance replacement policies are also used, but only in few Member States.

**Eligibility criteria** to access energy efficiency policies for low-income households is highly connected with the definitions of vulnerable consumers and energy poverty. Member States use their own definitions of vulnerable consumers to define eligibility criteria for the majority of their policies (see Table 3). For some Member States, the definition of vulnerable consumers is based on the eligibility to social welfare. Some countries specify disability or health problems as a major issue for describing vulnerability, although health characteristics are also combined with age or income when determining eligibility. Other Member States recognise those that have difficulty in affording energy costs. Eligibility criteria often focuses on levels of income and ignores the importance of housing standards. In order to improve the eligibility criteria, some countries have carried out consultations to develop better targeting strategies. For example, the Habiter Mieux Programme (FR) reformed its eligibility criteria after the three first years of the programme. In the period 2010-2013, grants were primarily allocated to resident homeowners. Concerned with the insufficient achievement of its objectives (target of 300,000 households renovated by 2017, while only 50,000 renovations were funded between 2010 and 2014), the programme extended eligibility to co-owners and non-occupant owners. As result, 46% of landlords became eligible. Despite the changes in eligibility criteria, the programme incentives usually end up diverted towards middle-class households in detriment of low-income ones (Crémieux, 2014).

**Table 3 Leading factors to identify vulnerable consumers in the EU-28**

| Leading factor | Member States |
|---|---|
| Energy affordability (low income / high expenditure) | FR[15], IT, SE |
| Eligibility to social welfare | BG, CY, DE, DK, EE, FI[16], HR, HU, LT, LU, MT[17], PL, PT, SI[18], |
| Disability / health | CZ, NL, SK, IE |
| Range of socio-economic groups | AT, BE, ES, GR, RO, UK[19] |
| Not available / Under discussion | LV |

**Source:** Authors based on (INSIGHT-E, 2015).

An overview of the impacts of these policies is presented in Table 4. Impacts in Table 4 are rated on a scale from low, medium and high for environmental and economic impacts, and negative, none and positive for social impacts. Ratings for environmental, economic and social impacts are taken from the MURE database[20].

[15] Under definition of energy poverty.

[16] Although term not officially recognised.

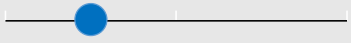
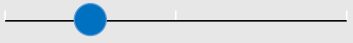
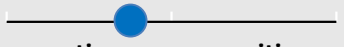
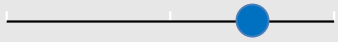
[17] Also has health and income categorisations.

[18] Also includes disabled individuals and according to the Concept for the protection of consumers fulfilling conditions of energy poverty, new definition and indicators will be based on social (economic) criteria.

[19] Based on OFGEM definition, not the national fuel poverty definitions.

[20] These ratings were assessed by national experts based on weighted impact evaluations in proportion to the country's final energy consumption.

**Table 4 Overview of impacts of energy efficiency policies targeting low-income households in the EU-28**

| Instrument | Topic | EU MS | Environmental | Economic | Social |
|---|---|---|---|---|---|
| Financial / Information | Energy audits | BE, DE, FR, IE, LV, SI |   |   |   |
| Financial | Incentives for energy efficient building renovations | BE, BG, CY, DE, DK, EL, ES, FR, IE, LT, LV, MT, NL, RO, SI, UK |   |   |   |
| Financial | Incentives for appliance replacements | AT, BE, DE, HU |   |   |   |
| Fiscal | Income tax credit / reduction | EL, FR, IT |   |   |   |
| Informative/ Education | Information campaigns and information centres | AT, DE, FR, IE, HU, MT, SI, UK |   |   |   |
| Market-based | Energy efficiency obligations | AT, FR, IE, UK |   |   |   |

**Source:** Compiled by authors from NEEAPs and national documents, (MURE database, 2016), (INSIGHT-E, 2015), (ACER, 2015)

### 4.4.1. Financial

#### a. Energy audits

Low-income households are evaluated by a professional with the aim to suggest the best ways to improve its energy efficiency and reduce its energy bill. Suggestions can include changes to inefficient habits, the replacement of household appliances, and also more expensive measures, such as building renovations. If expensive improvements are suggested, audits are usually complemented by other policies such as special financial incentives for building renovations or appliance replacements.

*Policy examples*

- «*Increasing Heat Energy Efficiency in Multi-Apartment Buildings*» *(LV):* The objective of this measure is to increase energy efficiency in multi-apartment residential buildings. The maximum standard rate of financial support is 50 percent of the total eligible costs, which is increased by a further 10 percent if at least 10 percent of apartment owners have the status of low-income households. The total eligible financial resources allocated to this measure is € 125 million. This measure has been co-financed by the EU Regional Development Fund (ERDF). This measure has been implemented in more than 740 multi-apartment buildings by April 2016, and the average thermal energy savings achieved as result of the implementation of renovation measures is in the range of 30 percent (MoEL, 2014). The specific energy savings per €1000 invested by the ERDF constitutes ~2 MWh/year. Based on the invested amount, the total ex-ante energy savings are ~125.6 GWh annually (MoEL, 2013).
- «*Better Energy Warmer Homes Scheme*» *(IE):* In this scheme, a surveyor visits potentially eligible homes to confirm their eligibility and ascertain the works required for each home. If eligible works are identified, an appointed installer will be assigned to do the identified building renovations at no cost to the households. The measure is co-funded by the Irish Government and the European Regional Development fund (ERDF). By 2008, € 10.93 million had been allocated to the scheme and 17,662 interventions were performed (SEAI, 2009). A large share of beneficiaries have reported improved health conditions.

#### b. Incentives for energy efficient building renovation

Incentives for low-income households are based on the applicant's income level or are combined with soft loans to cover 100 percent of the capital required. Incentives are usually combined with energy audits before any renovation is carried out.

*Policy examples*

- «*Habiter Mieux*» *(FR):* Low-income households receive between 35 and 50 percent of the required investment (with an extra 10 percent if the energy saving is more than 25 percent), which corresponds to a subsidy of up to €12.000 per renovation. This programme has invested € 1.68 billion in 150,000 renovations since 2010, and 50,000 additional renovations are targeted for 2016. More than 50 percent of the beneficiaries have achieved 38 percent of energy savings confirmed after the renovation work. Other results are that almost 30,000 jobs were created or protected, 80 percent of households no longer suffer from cold in winter, 94 percent are satisfied with the support received, and 83 percent of renovated households would not have undertaken the work without the programme's aid (ANAH, 2016).
- «*PAREER-CRECE programme*» *(ES):* The programme consists of a non-refundable direct subsidy of 30 percent of the renovation cost, complemented by a 12-year low-

interest loan for the remainder of the required investment. Depending on social criteria, the direct subsidy can be complemented by an additional 15 percent of the renovation cost. More than 2,000 applications were received, not all from low-income households. The programme has an available budget of € 92 million, but it has already received applications for € 129 million in direct subsidies and € 108 million in low-interest loans (IDAE, 2016). The implementation of this Programme is deemed to produce a total amount of 14.1 ktoe of accumulated energy saving during the 2014 – 2020 period.

- *Homes Energy Efficiency Program for Scotland HEEPS (UK):* The HEEPS is the Scottish government's initiative to tackle fuel poverty. It offers energy efficiency advice, information on low cost energy tariffs, and financing for refurbishing dwellings. In the year 2014/15, approximately 30,000 households were refurbished. In 2013/14, the program had a financial volume of £74 million.

### c. Incentives for appliance replacement

Replacing old inefficient basic appliances with new and more efficient ones is a good way to reduce energy consumption and costs in low-income households. These types of programmes often cover inefficient lighting, old washing machines and inefficient refrigerators. The majority of policies addressing building renovation for low-income households also include inefficient appliance replacement programmes. These programmes usually provide new appliances at no cost or a fixed sum to eligible low-income households.

*Policy examples*

- «*Replacement of Household Appliances programme*» *(HU):* Replacement of Household Appliances Sub-programme of the Green Invest System subsidises the replacement of an old washing machine and/or an old refrigerator per household. The aim is to make class A or higher label household appliances more widespread. The budget of the sub-programme was HUF 1 billion for replacing 7,915 refrigerators and 7,356 washing machines. Savings achieved with these replacements are estimated at 4 GWh per year (NKEK, 2010).
- «*Caritas-Stromsparcheck programme*» *(DE*): This programme offers advice to low-income households, provides simple energy-saving appliances including installation at no cost and, if certain conditions are met, awards a grant of €150 towards the purchase of a highly energy-efficient $A^{+++}$ refrigerator. The programme reaches approximately 50,000 households per year. The program recruits unemployed people living in low-income households as energy efficiency trainers. In this way, the programme ensures that trainer will connect well with trainees and will be sensible with their needs (see Box 4 in section 4.4.3.a).

## 4.4.2. Fiscal

### a. Income tax credit/reduction

Tax reduction usually includes discounts or exemptions for different types of taxes related to energy efficiency measures. They can also provide a reduction of Value Added Tax (VAT) for purchasing efficient appliances or materials to perform building renovation. In some cases, the installation costs are also subject to VAT reduction. Tax reduction policies targeting low-income households are very rare among the Member States.

*Policy examples*

- «*Tax relief on property tax on existing buildings*» *(FR):* Low-income social housing organisations that carry out energy saving works can benefit from a reduction of the

property tax on residential properties (TFPB) equal to a quarter of the expenses incurred during the year previous to that for which the tax is due.

- «PALULOS programme» *(FR):* In this programme, the VAT was reduced from 20.6 percent to 5.5 percent for restoration work in social housing. It was complemented with a direct subsidy equal to up to 15 percent of the projected costs and a loan with low interest rate. More than 1.25 million dwellings were retrofitted from 1997 to 2009, with a total investment of € 1.5 billion in grants.

### 4.4.3. Informative/education

#### a. Information campaigns and information centres

Measures of this type aim to give advice on energy savings to low-income households to identify potential savings and cost reductions. These policies include the creation of information centres and the supply of information such as targeted leaflets or brochures, seminars, or energy audits.

*Policy examples*

- «Renovation Information Service Points» *(FR):* Provides personalised and free technical and financial advice via 450 energy information centres. They are complemented by a helpline, a website, and a large information campaign called "J'éco-rénove, J'économise". The programme provides information on energy diagnosis and audits, technical options, financing, available public support, etc.
- «*Caritas-Stromsparcheck programme*» *(DE):* This programme aims to offer advice to low-income households, and provides simple energy-saving appliances including installation at no cost. As a result of the personalised advice offered by 'energy-saving assistants', a detailed "power saving schedule" is also given to the household and important information on how to save energy and money in the long term (Box 4).

**Box 4: Experience of Caritas raising awareness in low-income households**

**Immediate Energy Efficiency for low-income households**

The programme provides audits, behavioural education and new, more efficient appliances. A few days after the first visit, new and highly-efficient appliances are delivered and installed in audited houses. Delivered appliances achieved considerable savings and have an average value of €70 and could include larger devices such as efficient refrigerators.

**Key data:**

**Investment:** Average of €70 per household

**Savings:** Electricity: 16% of yearly consumption (~€98/year). Water: 17% of yearly consumption (~€31/year). Heating: 216 kWh (~€11/year)

**Coverage:** 150 locations, 948 energy counsellors, 226,150 households participated

**Potential:** 7.7 million persons (approximately 3.5 million households)

**Multiple benefits:**

- Increased awareness for energy expenditure, which lowers the risk of power cut-offs in case of non-payment. This reduces risks of health problems, limitations in residential activities, social exclusion and limited productivity.
- Lower public expenditure in heating bills of people receiving social-security payments
- Increase awareness and acceptance for environmental policy. Low-income households feel happy to contribute to environmental protection.

- The design of the Caritas-Program also leads to job-creation for unemployed by training unemployed to be energy counsellors. *"A very important feature of our program is the face to face counselling. Formerly unemployed trained as energy counsellors can advise low-income households in a personal and credible way"* Jürgen Schäferbarthold, Project Director.

#### 4.4.4. Market-based

**a. Energy efficiency obligations (EEO)**

An Energy Efficiency Obligation is a legislative mechanism that requires the obligated parties to meet quantitative energy savings targets by stimulating investment in end-use energy efficiency. Previous experiences have shown that actions are cheaper to implement in the non-residential sectors (ATEE, 2015). For this reason, some EEOs set specific targets or incentives to ensure that a minimum share of energy savings is achieved in the residential sector to alleviate energy poverty.

*Policy examples*

- *«Energy Efficiency Obligation Scheme» (IE):* Under this scheme, the obligated parties are energy distributors and retail energy sales companies with market sales greater than 600 GWh. Efficiency targets are allocated according to their proportion of energy market, which is divided into the following sub-sectors: 75 percent non-residential, 20 percent residential and 5 percent energy-poverty residential (which corresponds to 27.5 GWh per annum) (SEAI, 2014).
- *«Energy efficiency obligation system for energy suppliers» (AT):* Energy suppliers selling more than 25 GWh in Austria have to set energy efficiency measures at their own company or at their final customers. These energy efficiency measures must result in energy savings totalling 0.6 percent of energy sales in the previous year to final customers in Austria. Alternatively, the obligated parties can achieve their target by paying a compensation or penalty of 0.2 €/kWh, which may also support markets for ESCOs. Actions for households with fuel poverty get a bonus factor (ATEE, 2015).

**Box 5: Energy Efficiency Obligations for alleviating energy poverty**

Energy Efficiency Obligations (or white certificates) as pursuant to Article 7 of the EED currently exist or are planned in several Member States. The principle of EEOs is that suppliers (or other "obliged entities") are obliged to deliver a set amount of energy savings in homes. This is achieved using subsidies to incentivise consumers to install energy efficiency measures. Eleven Member States have implemented EEOs. In France, Ireland and the UK, these obligations are also intended to specifically tackle energy poverty. This can be achieved by implementing "ring-fencing" requirements for the obligated entities, which must install a set percentage of energy efficiency equipment in low-income households. The lack of ring-fencing means though that energy efficiency measures are installed mostly in households that are able to contribute to most of the cost of this measure. Only a small share of the beneficiaries of the obligations are energy poor because of the disproportionate cost burden for low-income households. In the UK only 37.2% of those eligible for the programme "Affordable Warmth" and 26.9% of households who will benefit from the Carbon Saving Communities are likely to be fuel poor (Rosenow, 2013).

### 4.5. Social policies addressing energy consumption in low-income households

Social policies do not aim at energy efficiency in particular. Table 5 shows an overview of social policies to alleviate the effects of energy poverty. Limiting disconnections due to non-payment, especially during winter months is a widespread policy to protect vulnerable

households. Some Member States have also focused their efforts on reducing energy bills through grants or discounts for people that cannot afford them. The use of social energy tariffs is common in Southern and Mediterranean Member States. In contrast, Central, Eastern and Nordic Member States usually offer direct payments of energy bills. Social security systems are also used by directly paying energy bills or by paying a fixed amount to cover housing expenses, including energy. Box 6 describes how social security systems approach energy poverty in different Member States.

**Box 6: Social security systems and energy poverty across Europe**

**Heterogeneous eligibility requirements across Europe**

In general, social welfare eligibility is restricted to residents of the Member State where the application is submitted and the decision about whether to grant social welfare is individually regulated by local institutions. The applicant must be willing to work unless this is impossible for health or other extraordinary reasons. The level of coverage varies markedly across the EU depending on the family situation (number of children, elderly people, orphan status, etc.), and the type of housing (rent, size of flat, etc.).

Next to the minimum standard of living payments, all Member States with the exception of Portugal and partly Hungary (where national legislation regarding home maintenance support was repealed in March 2015, but local governments can still provide support to households) provide allowances or supplementary benefits for heating, gas or electricity consumption. Eligibility requirements are heterogeneous, but have in common that the person or family in question should have insufficient income to cover the justified housing costs or be experiencing exceptionally difficult living conditions. This allowance can be given throughout the whole year in Austria, Belgium, Czech Republic, Denmark and Sweden. Bulgaria, Ireland or the UK grant a heating allowance for a shorter period of time. Lithuania reimburses families for 3 months if their heating costs are more than 20% of the state- supported income. Germany covers the full heating costs if these are considered appropriate.

**Table 5 Overview of social policies targeting low-income households**

| Policy instrument | Policy topic | Member State | Illustrative examples |
|---|---|---|---|
| Financial | Direct payments of heating, electricity | DK, FR, HU, IE, IT, LV, MT, PL, RO, UK | **France:** Fonds solidarité pour le logement (FSL – solidarity fund for housing).<br>**Hungary:** Household Energy Bill Subsidy to pay fuel heating bills.<br>**Ireland:** Fuel Allowance for an extra subsidy during winter months.<br>**UK:** Cold Weather Payment is a payment for each 7-day period of very cold weather.<br>**Ireland:** Household Benefits Package is a free basic supply of a certain yearly amount of energy. |
| | Social security paying the bill | AT, BE, BG, DE, FI, HR, IE, LT, PL, SE | **Belgium:** Heating allowances are granted by the Public Centres for Social Assistance.<br>**Lithuania:** Cash support for people on low incomes. |

| Policy instrument | Policy topic | Member State | Illustrative examples |
|---|---|---|---|
| | Social security paying fixed amount per month to cover basic needs, inc. energy | AT, BE, BG, CY, CZ, DE, DK, EE, EL, ES, FI, FR, HR, IE, IT, LT, LU, LV, MT, NL, PL, RO, SE, SI, SK, UK | All EU Member States with the exception of Portugal and partly Hungary (where support is not given at national level anymore but can be given by local governments) provide allowances or supplementary benefits for heating, gas or electricity consumption. |
| Fiscal | Reduced electricity tariffs | AT, BE, CY, EL, ES, FR, LV, MT, PT, RO[21], UK | **Austria:** Vulnerable households are exempt from paying components of the RES and CHP support. **Belgium:** There is a social tariff for natural gas and electricity for disadvantaged households set every six months by the CREG based on the lowest commercial tariff in the country. Electricity and gas supplied under social tariffs are also exempt from a special levy on their sales. **Spain:** The rate subsidy is a 25% discount established by the government on the electricity tariff aimed at protecting low-income households. |
| Legislative | Tolerance for non-payment | AT, BG, CY, DK, EE, EL, FI, FR, HU, IE, IT, LU, LT, NL, PL, RO, SI, SE, UK | In many EU countries, disconnection of vulnerable customers due to non-payment is not permitted, especially during winter months. Other measures include the right to deferred payments. |

**Source:** Compiled by authors from (MURE database, 2016), (MISSOC, 2016), (INSIGHT-E, 2015), (ACER, 2015).

## 4.6. Case studies in non-EU countries

### 4.6.1. USA: Combining social and energy efficiency policies to fight energy poverty

The United States has several laws addressing energy poverty in all its dimensions. The majority of policies are implemented on state level. The Federal Government encourages state action through two block grants:

- The Low Income Home Energy Assistance Program (LIHEAP), dealing with heating and cooling assistance as well as crisis assistance; and,
- The Weatherisation Assistance Program (WAP), addressing energy conservation measures.

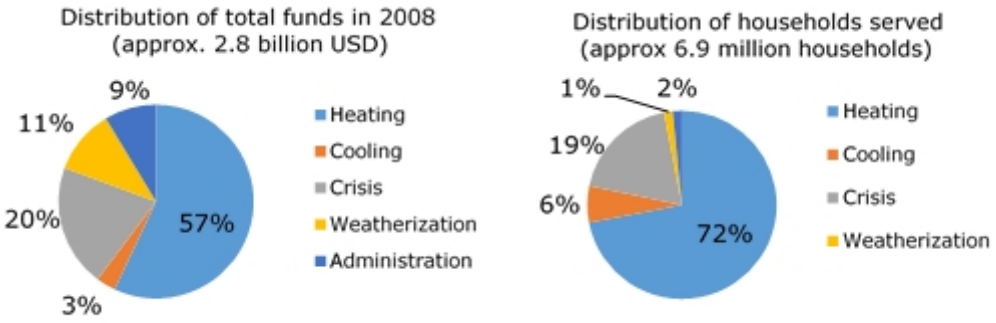
States may in addition implement individual policies to increase low-income households' access to energy. California is the leader in the implementation of additional policies; Massachusetts, Colorado, Connecticut, Washington, and New York follow. The most implemented policy measures are financial assistance towards energy bills, weatherisation grants, grants and low-rate loans for renewable energies and energy efficiency requirements for affordable housing.

The **LIHEAP** provides two types of funds: 1) regular funds that are allocated by using a statutory formula, and 2) emergency assistance for weather related or supply shortage

[21] Social tariffs were eliminated in Romania in 2015, after the electricity system was liberalised.

emergency. Figure 9 shows the distribution of funds for the fiscal year 2008. The program total funds were approximately US$ 2.8 billion (as compared to US$ 3 billion in 2014). Most of LIHEAP funds were spent in heating and cooling assistance (60 percent) and crisis assistance (20 percent), while weatherisation measures accounted only for 11 percent.

**Figure 9 LIHEAP distribution of funds and households served**




**Source:** Authors based on (Congressional Research Service, 2013).

The WAP has a long term focus in reducing energy poverty. WAP gives grants to states to implement free of charge weatherisation measures in low-income households. Weatherisation measures can include insulation, weather stripping, and maintenance or replacement of inefficient heating systems[22].

Eligible households are offered an energy audit, which includes the analysis of energy bills and existing appliances. The most cost-effective measures are identified and implemented free of charge. WAP explicitly targets multifamily buildings to address the split-incentives barrier. Federal guidelines state that multifamily buildings are eligible for WAP when at least 66 percent of the residents meet the weatherisation income eligibility requirements. WAP supports full-service training centres that specialise in multifamily retrofit training, as well as residents' education.

Table 6 provides an overview of WAP's benefits for single family dwellings in 2010. The program total funds were approximately US$ 2 billion and about 340,000 dwellings were attended. On average, a single-family household saves US$ 223 per year, which corresponds to approximately 12 percent of the annual energy bill. The average saving in gas consumption (16 percent) was higher than for electricity (8 percent).

**Table 6 Summary of benefits of the WAP (2010)**

| Concept | Amount |
|---|---|
| Total homes weatherised | 340,158 |
| Total carbon reduction | 7,38 Mtonnes CO2 |
| Average cost per weatherised dwelling | Total cost: US$ 6,812<br>DOE investment: US$ 5,926 |
| Average annual energy cost savings (per dwelling) | US$ 223 (12%) |
| Average annual gas savings | 16% |
| Average annual electricity savings | 8% |

**Source:** (Congressional Research Service, 2016).

[22] United States. Congressional Research Service. *DOE Weatherization Program: A Review of Funding, Performance, and Cost-Effectiveness Studies*. By Fred Sissine. Cong. Rept. R42147. 11 January 2012. Web

### 4.6.2. New Zealand: Warmer homes with financing model addressing split-incentives

New Zealand identified low-income households as a target group in its 2001 National Energy Efficiency and Conservation Strategy, aiming to improve their health and welfare through warmer homes and dampness resulting from retrofit isolation (EECA, 2001). Since then, several programmes were established for supporting and promoting energy efficiency, energy conservation and the use of renewable energy sources. Such programmes have been managed by the Energy Efficiency and Conservation Authority (EECA) with the collaboration of private sector, community groups, industry associations, as well as central and local government[23].

The "Warm Up New Zealand" programme focused on improving insulation in homes. Until 2016, over 281,000 homes have been insulated, including 139,000 low-income households. However, around 600,000 dwellings are estimated to still have inadequate insulation (EECA, 2015).

From 2009 to 2013, the programme "Warm Up New Zealand: Heat Smart" had a budget of NZ$340 million to serve 188,500 homes, including at least 70,000 low-income households (EECA, 2011). The programme over exceeded its expectations and reached 241,000 dwellings. The programme partly funded insulation retrofits (floor and ceiling); heater retrofits (primarily heat pumps, also pellet burners and efficient wood-burners), gas; and other retrofits (pipe lagging, draught-proofing, moisture barriers). The programme was specifically addressed to home-owners and landlords owning dwellings built before the year 2000. The costs and benefits analysis of the programme showed positive net benefits of around NZ$950 million, while the costs were over NZ$330 million (Grimes et al., 2012). The larger part of benefits was identified to be health issues in low to middle income households mainly attributed to improved insulation. It was also concluded that larger benefits can be achieved by considering four strategies: 1) Prioritise insulation over clean heating; 2) Target clean heating to houses that use reticulated gas rather than electricity for heating; 3) Target insulation to houses in cooler rather than warmer areas; 4) Target insulation to low and middle income earners and other at-risk groups in terms of illness.

In 2016 EECA has promoted the "Warm Up New Zealand: Healthy Homes" programme[24], focused on funding ceiling and underfloor insulation for rental properties occupied by low-income tenants. This programme targets 16,000 dwellings and has NZ$36 million funding available. Landlords and tenants holding a Community Services Card are eligible, both when the property or rental property was built before year 2000. Landlords are granted up to 50 percent of the retrofit cost, and in case the tenant is in charge of the retrofit, the full costs are compensated.

The New Zealand government also offers help to low-income households for paying heating bills. This is provided through the Work and Income Office that is part of the Ministry of Social Development. Households that are already beneficiary can ask for an Advance Payment of Benefit, receiving a maximum of NZ$300 that may have to be paid back. Other households can ask for Recoverable Assistance Payment in order to receive such support[25].

In 2005 the New Zealand Electricity Commission distributed a set of guidelines to help low-income domestic consumers that cannot afford their electricity bill. The suggested payment alternatives are prepayment meters, smoothed payments and redirection of income. It also mentions bonds as a way of payment, but it does not emphasise their use. Advices for

[23] Available at www.eeca.govt.nz/about-eeca/our-programmes/
[24] Available at www.energywise.govt.nz/funding-and-support/funding-for-insulation/ in August 2016
[25] Available at www.govt.nz/browse/health-system/help-in-your-home/paying-for-heating/ nn August 2016

disconnection and reconnection measures are included as well. The guidelines were updated in 2008 (Electricity Commission, 2008).

### 4.6.3. Australia: Retrofits by addressing information failure and capital constraints

The Australian government included a Low Income Energy Efficiency Program (LIEEP) in its climate change strategy proposed in July 2011[26]. The LIEEP promoted the creation of consortia for experimental innovative approaches to address information failure and capital constraints that prevent low-income and vulnerable households from improving their energy efficiency. Consortia consisted of local and state governments, community welfare organisations and energy companies. Grants were offered from 2012 to June 2016 in two funding rounds that resulted in 20 consortia successfully awarded with grants worth a total of US$ 55.3 million [27].

Most projects are in implementation phase and not many results are yet available. One of the awarded projects, the 'Low Income Energy Saver Direct Care and Motivators Project' by the Energy South East Councils Climate Change Alliance, has published its first outcomes. This project reports a consumption reduction of 13 percent in gas and 22 percent in electricity where retrofit and/or energy information actions were deployed (SECCCA, 2016). Householders reported improved comfort at home, increased room temperature during the winter, improved understanding of energy issues and would recommend the program to others if delivered in the future.

A rebate on energy bills is also available for low-income households under request[28], but such rebates and concessions may vary from state to state[29]. State governments also promoted energy efficiency initiatives as retrofits and assistance to people on low incomes. For example, New South Wales created the Home Power Savings Program (HPSP). This program was operated from 2010 to 2014, with the participation of around 220,000 low-income households that received a free in-home energy assessment from a trained energy expert, a Power Savings Kit of energy efficient products and a personalised Power Action Plan. The combined result was savings of 120,000 MWh of electricity and $36 million on power bills each year. Current energy efficient measure is the Home Energy Action program [30] aimed to higher return energy efficiency improvements.

### 4.6.4. Mexico: Less than expected energy savings in appliance replacement programme

Mexico has ample experience with state-wide and national programs for energy efficiency in households, most of them dealing with replacing incandescent light bulbs and replacing old appliances. Table 7 provides an overview of the programs in place since 1990.

A large *'cash for coolers'* programme to replace refrigerators and air conditioning units was introduced in 2009. Households with operative refrigerators or air conditioning units older than 10 years old were eligible. Participants had to purchase similar capacity replacing appliances that exceed by at least 5 percent the Mexican energy-efficiency minimum standards. The program provided both direct payment (US$ 80 to US$ 140) and subsidised

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[26] Available at: www.industry.gov.au/Energy/Programmes/LowIncomeEnergyEfficiency/Pages/default.aspx on August 2016

[27] Available at Www.industry.gov.au/Energy/Programmes/LowIncomeEnergyEfficiency/Documents/RoundOne%20grant%20recipients%20-%20updated.pdf (Round 1) and www.industry.gov.au/Energy/Programmes/LowIncomeEnergyEfficiency/Documents/RoundTwo%20grant%20recipients%20-%20updated.pdf (Round 2) on August 2016

[28] Available at www.resourcesandenergy.nsw.gov.au/energy-consumers/financial-assistance/rebates/low-income-household-rebate on August 2016

[29] Available at Www.aer.gov.au/consumers/my-energy-bill/rebates-and-assistance August 2016

[30] Available at www.environment.nsw.gov.au/households/government-programs.htm on August 2016

financing (US$ 270 to US$ 700) in the form of a one-time credit that had to be paid back in the electricity bill with a preferential interest rate over a 4-year period. Households with average electricity consumption of less than 175 kWh per month in winter months qualified for the more generous direct payment option. In addition, most participants were eligible for an additional subsidy of approximately US$ 30 for the transport and final disposal of the replaced equipment. Since 2009, about 1.5 million refrigerators were replaced (Davis et al. 2012).

Because of its large reach, with over 1.9 million refrigerators replaced, the appliance replacement program has been subject to discussion and evaluation. Ex-post evaluation of the program showed substantially lower savings than ex-ante forecasts conducted by the World Bank. The ex-post estimates show that savings from refrigerator replacements account to about 134 kWh/ year, which is about one-quarter of the savings expected by the World Bank (481 kWh/year). The replacement of air conditioning systems even showed a rebound effect, with electricity consumption increasing by 92 kWh/year. The monetary savings are estimated at US$ 13 household per year. The overall net-benefits of the programs remain questionable and subject to debate (Davis et al., 2012).

**Table 7 Overview of energy efficiency programmes – Mexico**

| Program name | Description | Scope |
|---|---|---|
| *Programa de Sustitución de Equipos Electrodomésticos* | Refrigerators and air conditioning replacement programme | Between 2009 and 2012 approx. 1.9 million refrigerators and air conditioning units were replaced. |
| FIPATERM | Thermal renovation of dwellings | Since 1990 more than 100,000 renovation measures registered. |
| Ilumex | CFL bulbs replacement programme | Between 1993 and 1996 over 2.3 million bulbs were replaced in the states of Guadalajara and Monterrey. |
| Programa del FIDE | CFL bulbs replacement programme | Between 1996 and 2006 over 10 million bulbs were replaced by the state-owned utility CFE. |
| Normas Oficiales Mexicanas | Minimum requirement standards for electrical devices and equipment in the residential sector | Since 1996 more than 10 NOM (official Mexican norms) have been released, in particular targeting illumination, air conditioning, water pumping, clothes' washing and stand-by energy. |
| Tarifa Doméstica de Alto Consumo | Non-subsidized electricity tariff for high-consumption users | In 2002 a new, non-subsidised energy tariff was introduced, which currently covers approx. half million users. |
| Hipoteca Verde | Green financing programme for energy conservation measures in households | Firstly introduced in 2008, it mainly covers thermal insulation measures. |
| Luz Sustentable | CFL bulbs replacement programme | Between 2011 and 2012, about 46 million incandescent bulbs were replaced with CFL bulbs. |

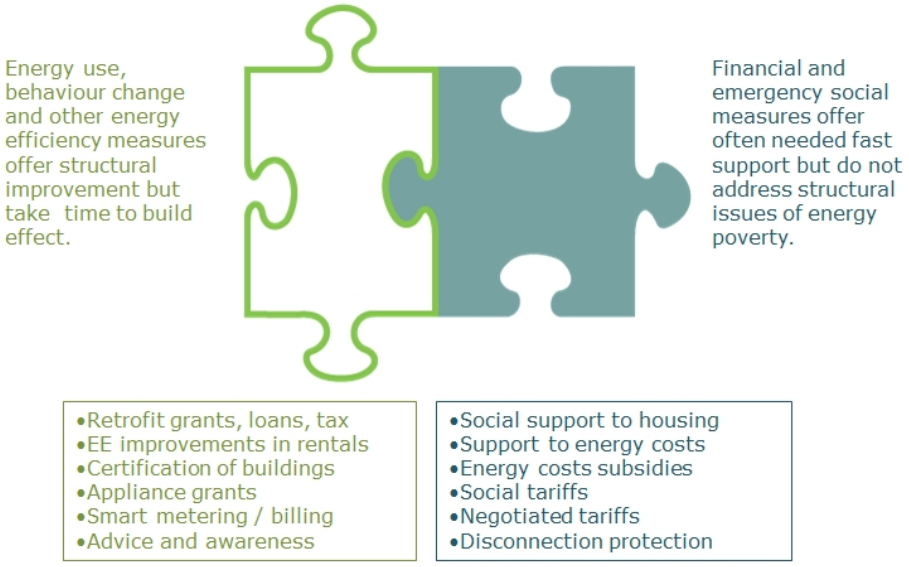
**Source:** (CONUEE, 2016).

## 4.7. Comparative analysis

### 4.7.1. Policy effectiveness on fighting energy poverty and delivering multiple benefits

Energy efficiency policies result not only in positive environmental impacts, but they can also alleviate energy poverty by reducing energy costs of households. This is an advantage over social policies only affecting household income, but not the environment (BPIE, 2014; Hills, 2012; IEA, 2011). Finding the right balance between energy efficiency and social policies is the challenge to combating energy poverty effectively and achieving a good level of energy efficiency in the household sector. Energy efficiency policies aim at structural improvements but take time to build effect. Social policies offer rapid alleviation of energy poverty effects, but do not remove barriers to energy efficiency and consequently, they are not able to reduce the energy costs incurred by low-income households (see Figure 10).

**Figure 10 Energy efficiency and social policies to combat energy poverty**




**Source:** Authors.

In Table 8, the three different groups of policies analysed in this study are assessed with regard to their impact on removing barriers to energy efficiency and their environmental, economic and social impacts. This assessment is based on the detailed analyses elaborated in sections 4.3, 4.4 and 4.5.

**Table 8 Policy effectiveness to deliver multiple benefits**

| **Policy** | **General EE policies** | **EE policies** addressing low-income households | **Social policies** addressing energy consumption in low-income households |
|---|---|---|---|
| **Impact on** | **(+)** = positive effect **O** = neutral **(-)** = negative effect | | |
| **Removal of barriers to energy efficiency:** | | | |
| in private households in general | **(+)** | **O** | **O** |
| in low-income households | **O** | **(+)** | **(-)** |
| **Effectiveness to deliver multiple benefits of energy efficiency:** | | | |

| **Policy** | **General EE policies** | **EE policies** addressing low-income households | **Social policies** addressing energy consumption in low-income households |
|---|---|---|---|
| Environmental impacts / Target achievement | **(+)** | **(+)** | **(-)** |
| Economic impacts | **(+)** | **(+)** | **(-)** |
| Social impacts | **O / (-)** | **(+)** | **(+)** |

**Source:** Authors.

The first conclusion is that general energy efficiency policies positively contribute to the general removal of barriers in private households and to the environmental and economic impacts of energy efficiency, but do not address specific barriers affecting low-income households or social impacts. Depending on the specific policy, they can even have a negative impact on the elimination of the causes of energy poverty.

Elimination of the causes of energy poverty is more effectively achieved by energy efficiency policies specifically addressing low-income households. These policies also contribute to the environmental and economic impacts of energy efficiency and thereby also to the achievement of medium- and long-term energy and climate targets. Social policies addressing energy consumption are successful in alleviating the effects of energy poverty, but they can often lower the incentive for investing in energy efficiency.

From Table 8 two strategies on fighting energy poverty seem plausible:

a) The use of separate policy groups for achieving the goals of energy efficiency and the alleviation of effects of energy poverty. In other words, the use of general energy efficiency policies for the overall reduction of energy consumption and greenhouse gas emissions in the residential sector, and the use of social policies to combat the effects of energy poverty in low-income households.
b) Address both goals (energy efficiency and alleviation of effects of energy poverty) with a holistic approach implementing energy efficiency policies addressed specifically to low-income households.

Option a) combats energy poverty by addressing income of households. Option b) combats energy poverty by addressing energy efficiency and the high costs of inefficiency. Option b) also delivers the multiple benefits of energy efficiency (improved health, increased local spending and employment, less energy subsidies, higher property values, social inclusion, several local and infrastructure improvements, etc.). Option b) takes time to build up its effects so it can be combined temporarily and to the extent needed with social components. Several studies have already concluded that the use of suitable energy efficiency policies to specifically reduce energy poverty may be the most effective solution (IEA, 2011; Hills, 2012; Walker et al., 2012; BPIE, 2014).

The comparative analysis of good practices presented in the sections 4.7.2 through 4.7.5 only takes into account energy efficiency policies specifically addressing low-income households, either by a specific component of the policy or by exclusively targeting this group. These policies cover:

- Energy audits, information campaigns and information centres;
- Financial incentives for energy efficient building renovations/promoting renewables;
- Income tax credits or reduction;
- Energy efficiency obligations (EEOs).

### 4.7.2. Energy audits and information campaigns

Several policies classified under the topic of energy audits and information campaigns already have a strong focus on low-income households. Given the heterogeneity of energy efficiency benefits and the individual measures necessary to improve the energy consumption of buildings, energy audits are a very effective way to determine individual needs, in particular for low-income households. They are generally part of bigger policy programmes, as outlined in Table 9.

Best case examples – due to their targeted and extensive coverage – have been identified in Ireland and Scotland within the Better Homes Schemes and the Home energy efficiency programmes, as well as in Germany with the Caritas Stromspar-Check. All these programmes foresee widespread information campaigns followed by audits as the first step to energy efficiency investments, which are later achieved through allowances or loans (for extensive thermal refurbishment in Ireland and Scotland, appliance replacements in Germany).

**Table 9 Comparative analysis of energy audits and education campaigns**

| Best cases | Key characteristics | Success factors |
|---|---|---|
| **Germany**<br>*Caritas Stromspar-Check* | • Free face to face advice for low-income households.<br>• Advisors are the former unemployed, i.e. they know the needs and can well address low-income households.<br>• Audits are paired with appliance replacements which leads to immediate substantial savings.<br>• Programme expanding and it now includes refrigerator replacement and monitoring. | • Face to face advice and audits are implemented to overcome lack of awareness barrier as well as the lack of information barrier.<br>• Programmes target to identify specific needs of low-income households and precede appliance replacements or extensive refurbishments. |
| **Ireland**<br>*Better Homes Schemes* | • Hotline, webpage, personal advice on extensive thermal refurbishment of households for low-income households. | |
| **Scotland**<br>*Home energy efficiency programmes* | • Hotline, webpage, personal advice on extensive thermal refurbishment of households for low-income households. | |

**Source:** Authors.

### 4.7.3. Financial incentives

The most important barrier for the implementation of energy efficiency measures in low-income households is the lack of access to capital. Financial aid for energy efficiency investments such as financial incentives for building renovations is the most important policy group for getting energy efficiency measures implemented in the low-income sector. With low-income households commonly living in older buildings, large energy saving potentials can be tapped through thermal renovation given adequate financing. In Table 10, *the Sanierungs Check in Austria, the Habiter Mieux* in France, the *Better Homes Schemes in Ireland,* the *Home energy efficiency programmes in Scotland, the Weatherization Assistance Program (WAP) in the USA and the New Zealand Warmer Homes* are best-case examples targeting extensive thermal refurbishment in low-income households, providing grants earmarked for measures such as wall and attic insulation, boiler replacements, etc.

**Table 10 Comparative analysis of financial incentives for building renovations**

| Best cases | Key characteristics | Success factors |
|---|---|---|
| **Austria**<br>Sanierungs-check | • Unique and non-repayable grant to private houses to reduce energy consumption.<br>• In 2013, approx. 24,000 households were addressed with an average subsidy of €4,900. | • Programmes specifically target extensive thermal refurbishment of low-income households.<br>• Programmes provide targeted cheap finance and subsidies to low-income households for individual energy efficiency measures.<br>• In order to deliver the individually required energy efficiency measures to the households, the programmes foresee preliminary audits and face to face advice in low-income households.<br>• The programmes combine information campaigns, audits, finance and specifically targets the split incentives. Eligibility and administrative procedures are kept simple. |
| **France**<br>*Habiter Mieux* | • Targeted finance and grants for thermal insulation and other measures in very low-income households (up to €12,000 subsidy).<br>• Targeted subsidies for health and safety measures, against energy poverty, to make the handicapped and elderly more independent.<br>• Targeting both private and social housing<br>• 50,000 households involved in 2014. | |
| **Ireland**<br>Better Homes Schemes | • Targeted finance and grants for thermal insulation, boiler exchange, etc.<br>• Provides additional bonuses the more measures are done, thereby incentivising extensive refurbishment. | |
| **New Zealand**<br>Warm Up New Zealand: Healthy Homes | • Four lessons learned: 1) Prioritise insulation over clean heating; 2) Target clean heating to houses that use reticulated gas rather than electricity; 3) Target insulation to houses in cooler rather than warmer areas; 4) Target insulation to low and middle income earners.<br>• Address split-incentives barrier. Landlords and tenants are eligible. Landlords are granted up to 50% of the retrofit cost and tenant have the full costs compensated.<br>• Beneficiaries may have access direct payment of heating bills by the social security if necessary. | |
| **Scotland**<br>Home energy efficiency programmes for Scotland | • Targeted finances and grants programme based on the experience with previous programmes, including the Boiler Scrappage Scheme (BSS), the Home Insulation Scheme (HIS), the Universal Home Insulation Scheme (UHIS) and the Energy Assistance Package (EAP), which have delivered over 230,000 energy efficiency measures to Scottish households since 2009/10.<br>• Tackles split incentives by giving landlords funds to install energy efficiency measures in their property.<br>• In 2014/15, approx. 30,000 households received measures through HEEPS (2014/15). | |
| **USA**<br>Weatherisation Assistance Program (WAP) | • The WAP targets low-income households<br>• Information services provided by local agencies<br>• Audits offered to eligible households<br>• The most cost-effective energy conservation measures are identified and implemented free of charge.<br>• Extensive thermal refurbishments in multi-family buildings targeted. | |

**Source:** Authors.

These programmes are extensive in the sense that financial aid is combined with other components in order to be successful, most importantly information campaigns, targeted audits and low administrative complexity. The programmes have been successful in delivering financial support to low-income households: *Habiter Mieux* assisted over 50,000

low-income households in 2014 and the *Home energy efficiency programmes for Scotland* approximately 30,000 homes in 2014/15. All these programmes are designed with an integral approach to specifically target the needs of the low-income sector.

The *WAP* in the USA is similar to the Scottish and Irish schemes in promoting energy efficiency in households. Information, audits and funds are tailored to the needs of low-income households. *WAP* supports full-service training centres that specialise in multi-family retrofits, as well as residents' education. This helps to tackle the split incentives barrier. The average savings are approx. US$ 220 per year, corresponding to approx. 12 percent of the annual energy bill. The average investment costs are slightly higher than US$ 5,926.

The *'Warm Up New Zealand: Healthy Homes'* programme builds on its predecessors *'Warm Up New Zealand: Heat Smart'* (2009-2013) to focus on funding ceiling and underfloor insulation for rental properties occupied by low-income tenants. This programme targets 16,000 dwellings and has NZ$36 million funding available. Landlords and tenants holding a Community Services Card are eligible, both when the property or rental property was built before year 2000. Landlords are granted up to 50 percent of the retrofit cost and tenants have the full costs compensated. The programme is combined with direct payment of heating bills by the social security system if necessary.

### 4.7.4. Income tax reduction or tax credits

Policies related to income tax reductions are not expected to directly incentivise energy efficiency investments in low-income households because low-income households pay no or little income tax. In contrast to tax reductions, refundable tax credits are a possibility to incentivise energy efficiency investments in low-income households; regardless of a taxpayer's income or tax liability, within a refundable tax credit scheme, the tax payer is entitled to the entire amount of the credit. The *Crédit d'Impôt Transition Energétique* in France (see Table 11) is such a scheme. It offers a refundable tax credit with a limit of 8,000€ for a single person, 16,000€ for a couple and 400€ in addition per dependent for the 5- year period ending at the latest in December 2015 (MURE 2016). Implementing tax schemes as refundable tax-credits as opposed to tax reductions is an effective way to ensure that not only high income households are incentivized to invest in energy efficiency.

**Table 11 Comparative analysis of income tax reduction or tax credits**

| Best case | Key characteristics | Success factors |
|---|---|---|
| **France**<br>*Crédit d'Impôt Transition Energétique (CITE)* | • Tax reductions specifically targeting landlords or leaseholders that pay income tax.<br>• Tax credit of 30%, without income conditions and without the obligation of works. | • Refundable tax credit regardless taxpayer's income or tax liability. |

**Source:** Authors.

### 4.7.5. Energy efficiency obligation schemes

At the moment, energy efficiency obligation schemes are the most prominent example for a general energy efficiency policy which includes a specific component targeting low-income households in some Member States (at the moment Austria, France, Ireland and the UK). As shown in Table 12, the design of this component varies (e.g. a specific target or a bonus for actions in low-income households). This approach can be a good example for other energy efficiency policy topics currently not including specific components for low-income households (e.g. building regulations or building certificates).

**Table 12 Comparative analysis of energy efficiency obligations**

| Best cases | Key characteristics | Success factors |
|---|---|---|
| **Austria**<br>Energy efficiency obligation for energy suppliers | • Energy suppliers selling more than 25 GWh in Austria have to implement energy efficiency measures in their own company or final customers.<br>• Actions for households with energy poverty get a bonus factor (*1.5). | • Address both general barriers in the residential sector (behavioural inertia, lack of awareness, lack of information) and specific barriers in the low income household sector, in particular lack of access to capital. |
| **Ireland**<br>Energy efficiency obligation scheme | • Under this scheme, obligated parties are energy distributors and retail energy sales companies that have market sales greater than 600 GWh.<br>• Efficiency targets are allocated according to their proportion of the energy market: 75% non-residential, 20% residential and 5% energy-poverty residential. | |

**Source:** Authors.

### 4.7.6. Estimated costs of energy efficiency interventions in low-income households

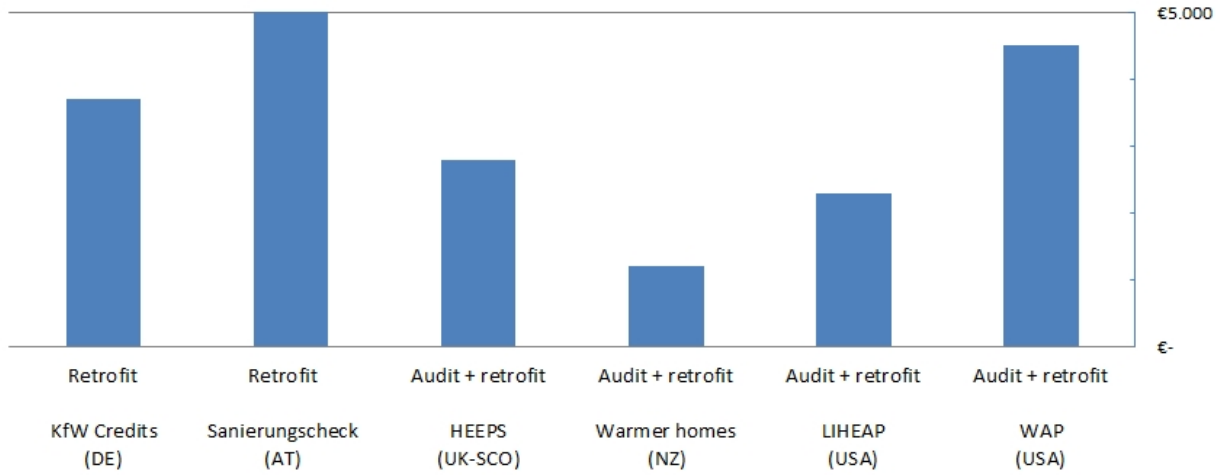
The energy efficiency measures comprised by the different programmes, the different eligibility criteria, the extent of the retrofit, the percentage financed, the very specific climate and living characteristics in different countries, and the different targeted audience influence the cost of intervention of each programme. In an attempt to compare the order of magnitude of the different programmes, a compilation of estimated intervention investments for few selected and representative programmes is presented in Figure 11. These estimated investments are presented in euros and vary between €1200 and €5000 per household. These values are comparable with the average cost of renovation in the European residential sector collected by Enerdata in its Zebra2020 tool[31].

For illustration of an order of magnitude there are between 22 and 70 million households[32] in the EU suffering from energy poverty and unable to afford proper indoor thermal comfort.

[31] Tool available at http://www.zebra-monitoring.enerdata.eu/overall-building-activities/average-cost-of-renovation-in-residential-per-m2.html

[32] Roughly equivalent to 50 and 160 million people with an estimate of 2.3 people per household.

**Figure 11 Estimated average investment in low-income households – selected programmes**




**Source:** Estimated by authors.

## 4.8. Conclusions

The overall conclusion is that the EU policy framework considers the need for energy efficiency policies combined with social policies addressing energy consumption in low-income households to fight energy poverty. But it does not prescribe how these measures should be integrated into specific EU and Member State regulations, or how to ensure that all household segments are reached. The lack of adequate and common EU definitions of energy poverty and vulnerable consumers is a barrier to standardise an EU policy approach and increase political visibility, but also runs the risk of erasing social demographic and regional complexities.

Energy efficiency policies aim at structural improvements but take time to have effects. Social policies offer the rapid alleviation of energy poverty effects, but do not remove barriers to energy efficiency. Finding the right balance between energy efficiency and social policies is the challenge to combating energy poverty effectively. Several factors can affect this choice of policies (weather conditions, type of buildings, eligibility criteria to social policies, etc.).

The analysis shows that most of the existing energy efficiency policies have positive environmental and economic impacts, but are neutral or even negative with regard to social impacts. These policies address several informational, behavioural and financial barriers to energy efficiency, but do not sufficiently address the split-incentives barrier, other than by providing a direct subsidy. Policy approaches to deal with the split incentives barrier could include investment models with longer payback time, or by requiring that all rental dwellings comply with a minimum energy performance to avoid the landlord-tenant dilemma before it occurs.

Energy efficiency policies specifically targeting low-income households are effective in delivering social benefits in addition to positive environmental and economic benefits. However, there are only a limited number of such policies in place in EU Member States. For example, Central, Eastern and Nordic Member States with severe winters have focused their general energy efficiency policies on financial instruments to improve energy efficiency of buildings (insulation and efficient heating systems). But most of these policies are not targeted specifically at low-income households. Instead, energy poverty is tackled by using social-security benefits, as is the case with other basic services.

As for energy efficiency policies targeting low-income households, energy audits combined with financial instruments consisting of loans and grants for building renovations are the most

widely established measure. Energy audits and dedicated information campaigns build on a better understanding of improvement opportunities, their benefits and costs. They raise awareness on energy efficiency and inform household residents of potential economic savings in their energy bills. The Caritas Strompspar check in Germany is the best identified example for energy audits and informational campaigns. The Sanierungs Check in Austria, the Habiter Mieux in France, the Better Homes Schemes in Ireland, the Home energy efficiency programmes in Scotland, the Weatherization Assistance Program (WAP) in the USA and the New Zealand Warmer Homes are best-case examples targeting extensive thermal refurbishment in low-income households. They provide grants earmarked for measures such as wall and roofs insulation and boiler replacements. European and international successful experiences identified in this research have in common that they address retrofit and weatherisation of dwellings as priority energy efficiency measures. Programmes financing retrofit and weatherisation of low-income households result in multiple benefits that are rapidly recognised by residents. Those multiple benefits include higher comfort levels and recognisable health benefits due to warmer room temperatures during winter time. Information policies and appliance replacement policies are also used, but to lesser extent.

# 5. POLICY OPTIONS

Six overall recommendations are proposed in this study. These recommendations concern matters that affect the design and implementation of energy efficiency policies. These recommendations include specific suggestions for their consideration in the EU policy framework, the future recast of the EED, the EPBD and the Labelling Directive, and in the design of more effective policies at Member State level.

## 5.1. Missing definitions

**Recommendation 1: Define broad common definitions of energy poverty and vulnerable consumers at EU level to facilitate the design of effective energy efficiency policies and facilitate their monitoring, but leave the Member States the ability to further refine these definitions to take into consideration their specific country or regional differences.**

Understanding the potentials and options for energy efficiency improvements in low-income households as well as the (potential) effectiveness of energy efficiency policies and measures is hampered by missing definitions and the relatively low level of information available and its lack of consistency. As pointed out in background analysis in section 1.1 and section 4.1, the understanding of energy poverty and vulnerable consumers is hampered by the lack of a common definition of either term. Arguments in favour of common definitions are the higher political visibility and public awareness, the possibility to develop a common language around the problem, the ability to devise standardised statistic and measures, and the opportunities for integration with different policy domains. The analysis of existing policies and measures shows that ex-post analysis is only available for a small number of policies and measures, which makes it harder to identify the success and failure factors of energy efficiency policies and measures. Arguments against common definitions are the risk of erasing the complexity of multiple components interacting in energy poverty, the risk of prioritising specific groups of vulnerable consumers over others due to targeting inaccuracies, and the risk of dismissing region and country-specific differences. In short, a common definition may help standardise policy and increase political visibility but also runs the risk of erasing social demographic and regional complexities. Despite the risks, a common definition of terminology and more information on the results and impacts of energy efficiency programmes would not only support the design of individual policies, but also help to understand which best-practice examples could be applied to other Member States and target groups. The most suitable general definition of energy poverty is the one given by is given by Bouzarovski & Petrova (2015) (see Box 1): "the inability to attain a socially and materially necessitated level of domestic energy services". The further refining of this definition should be left to Member States to take into consideration country or regional differences if needed..

*Specific suggestions*

- Preamble 20 of the **EED** refers to vulnerable consumers. Article 2 could include a clear definition of vulnerable consumers, and where possible, an additional reference to and definition of energy poverty. Article 24 (Member States reporting) could be extended with a requirement for Member States to report on the achieved results of policies and measures. If deemed useful, this could include specific indicators of how energy poverty is taken into account in the formulation of policies and measures.
- Preamble 20 of the **EPBD** refers to the concept of energy poverty. Art.2 could include a clear definition of energy poverty and, if deemed useful, a suggestion that Member States should monitor the progress of addressing energy poverty and take the results of that monitoring into account when designing supporting policies.

## 5.2. Achievement of EU's climate targets

**Recommendation 2: The challenging European long-term targets on energy saving in the buildings require that all types of end-users are addressed, including vulnerable households[33]. Active monitoring should reveal whether this is achieved in each Member State.**

Buildings are responsible for 36 percent of $CO_2$ emissions in the EU. The EU's Energy Efficiency Plan 2011 identified buildings as having the largest energy saving potential. Meeting the EU's overall GHG emission reduction targets will require that the targeted zero emission levels are achieved in all buildings (including existing ones) by 2050.

The analysis of barriers to energy efficiency (see chapter 3) reveals that it will be a major challenge for households to reach the required energy efficiency targets. This is even more challenging for low-income households as they face additional barriers. Consequently, it is vital that policy frameworks dealing with energy efficiency targets and measures in the EU and its Member States ensure that energy efficiency improvements are achieved equally by all end-users. Where the existing policy framework does not explicitly address this issue, it is likely that the presence of the additional barriers will prevent low-income households becoming energy efficient.

Section 4.1 analyses the EU's policy framework. Preamble 16 of the EED requires Member States to establish a long-term strategy beyond 2020 for mobilising investment in the renovation of residential and commercial buildings with a view to improving the energy performance of the building stock. The preamble also discusses elements that such a strategy should address. Preamble 17 mentions that the rate of building renovation needs to be increased, and Article 5 sets an obligation to renovate central government buildings. The EPBD specifically aims to support the important role of energy efficiency improvement in buildings as part of achieving the EU's overall $CO_2$ reduction target, but it does not include a vision of the targeted building stock by 2050 or the strategy for achieving this objective. Such a vision could be included to strengthen the request to report the targeted achievements. The EPBD requires Member States to report the use of policies and measures to improve and support the energy performance of buildings. However, it does not require any reporting on whether all the target groups are reached or whether specific barriers can be identified that prevent the policies reaching some of the targeted groups or market segments. Article 3 of the Labelling Directive requires Member States to report their enforcement activities and the level of compliance with the labelling and standard product information concerning the energy consumption of energy-using products. The same Article also requires Member States to ensure that the introduction of the system of labels etc. is accompanied by educational and promotional information campaigns. These campaigns aim at promoting energy efficiency and the more responsible use of energy by end-users. However, there is no requirement that all groups should be equally addressed.

*Specific suggestions*

- The **EED** could require that Member States report on achieving energy efficiency improvements at the level of household segments and address differences in the different segments, specifically how those segments lagging behind will be addressed. A more stringent addition to the **EED** could be the requirement to ring-fence specific target groups in the implementation of Article 7. In other words, if monitoring shows

[33] The fact that energy efficiency targets are not being reached in specific target groups concerns more than just low-income households, and includes other groups such as the elderly or rural populations. Consequently, the conclusions and recommendations provided may be valid for these groups, too. However, given the focus of this study, we only refer to low-income households as the target group that needs to be addressed.

that specific target groups (such as low-income households) are insufficiently addressed, then the Member State could be required to include a specific sub-target in its **energy efficiency obligation targets** (for example, requirement of certain percentage of energy efficiency improvements is in low-income households).

- The **EPBD** could include a vision of the whole building stock for 2050 and outline the roadmap to achieve this vision. This vision should be in line with the EU's low-carbon economy roadmap towards 2050 and the 2011 energy efficiency plan.
- Art. 10 of the **EPBD** (financial incentives and market barriers) could be expanded by a requirement that Member States report on whether all household segments are reached and to identify specific barriers that hamper policies reaching some household segments. References to priority sectors could be made in the preamble of the EPBD such as low-income households or energy-poor households.
- The **EPBD** could strengthen the requirements with respect to the implementation of minimum energy performance requirements (article 4), the energy performance certificates (Articles 11-13) and the building certification methodologies (Annex I), and could emphasise that **all target groups** must be addressed by these more stringent requirements. **Member States** could be asked (for example in Art. 7) **to formulate specific policies** if this is not the case. Such policies could for example include **incentives to invest in energy efficiency in buildings** and support commercial activities to offer energy efficiency services.

### 5.3. Multiple benefits and risk of rebound effects

**Recommendation 3: Design energy efficiency policies in such a way that they support additional (social or economic) benefits and limit rebound and counterproductive effects.**

The review of the MURE database of all existing energy efficiency policies (see sections 4.3, 4.4 and 4.5) reveals that only a low share of energy efficiency policies include components specifically addressing low-income households. Literature analyses show that these may generate rebound effects: savings on energy bills can be used to purchase additional appliances, or heat more rooms in the house. However, despite these negative rebound effects on energy consumption, there are other positive effects such as better health and well-being, and improved property values. Such additional benefits are important reasons for implementing specific energy efficiency policies for low-income households. These benefits should be considered when designing and monitoring policies and measures.

In addition to positive additional impacts, counterproductive effects may also occur. Case studies and stakeholder interview (see section 2.4) reveal that in some cases the improved energy efficiency of social housing has led to gentrification[34] and the eviction of households from improved rental dwellings as rents increased. Such effects should be taken into account when designing policies, especially when considering the financial impacts on low-income households. Experts have recommended addressing the energy efficiency improvements of social housing to entire neighbourhood not just individual dwellings in order to avoid gentrification.

[34] Gentrification is a process of renovation and revival of deteriorated urban neighbourhoods by means of influx of more affluent residents, which results in increased property values and the displacing of lower-income families and small businesses.

*Specific suggestions*

- In Article 7 (section 9f) and in Article 17 of the **EED**, the Commission could request **Member States** to take the multiple benefits of energy efficiency into account in training and education to increase the understanding and appreciation of the further benefits and therewith mitigate counterproductive effects. Similar actions could be taken in the **EPBD** Article 20 (information), and in Article 3 (responsibilities of Member States) and Article 4 (information requirements) of the **Labelling Directive**.
- In Article 4 of the **EED** (building renovation strategy), the Commission could refer to the multiple benefits and suggest taking them into account when defining the strategy and policy measures.
- **Member States** can pro-actively **communicate the multi-benefits** of energy efficiency to their citizens and design policy support instruments that stimulate achieving those benefits to break the vicious circle of energy poverty. Member States could alter their social policies and instead of providing **lower energy costs of low-income households** (currently usually via energy subsidies) focus more on targeting energy efficiency improvements in those households with similar economic impacts and additional side benefits.
- Finally, the European Commission could engage **Member States** to actively share the lessons learned about rebound effects and the counterproductive effects of energy efficiency policies across Europe. This knowledge would help Member States to design effective policies, especially those for low-income households.

## 5.4. Policy framework to address specific barriers

**Recommendation 4: In situations where energy efficiency improvements have difficulties reaching certain end-users, the policy framework needs to integrate measures that address specific barriers or monitoring requirements for these end-users.**

Low-income households are more prone to energy poverty because they are affected by **persistent barriers** to energy efficiency. These barriers lower the success rate and impacts of policies. Such barriers (see chapter 3) include in particular the **split-incentives barrier** (landlord/tenant dilemma, section 3.2), **lack of funding or lack of access to external capital**[35] and the **lack of adequate and sufficient information**.

Consequently, there is a need for intervention at **policy framework level** to specifically and carefully address the barriers affecting low-income households. Energy poverty is currently mostly addressed by social policies (see section 4.5), but do not break the vicious circle of energy poverty in the long term because they do not improve energy efficiency. Removing persistent barriers to energy efficiency improvements in low-income households is likely to reap benefits for both the low-income households and the Member State, as it may lower public spending on social security-related energy expenses.

Addressing such matters requires improved understanding of how the existing policy framework impacts the energy efficiency of various household segments, and in particular the low-income household segment. Consequently, additional monitoring should focus on those barriers affecting low-income households. Results of this monitoring will improve the current understanding of how energy efficiency policies can be further developed, or which

[35] Lack of access to external capital does not only affect tenants, but also low-income homeowners (especially in the CEE region) that do not want to use their home as collateral for loans.

specific policies should be formulated to ensure energy efficiency improvements are achieved across all household segments.

*Specific suggestions*

- The **EED** could address the issue of **persistent barriers** to reaching low-income households in its preamble and could require Member States to include such considerations in their strategy plans for building renovation (Article 4). Moreover, Article 19 (Other measures to promote energy efficiency) could be expanded to specifically address removing barriers to the uptake of energy efficiency by low-income households, including for example the obligation for Member States to remove regulatory barriers to the uptake of energy efficiency measures. Also Article 20 (on funds, financing and technical support) could be expanded by explicitly mentioning the use of funds to address persistent barriers.
- Preambles 18, 19 and 20 of the **EPBD** could be expanded to include specific mention of the **additional barriers** to the uptake of energy efficiency measures in low-income households and the possibilities to address such barriers. Article 10 (financial incentives and market barriers) could be expanded by asking Member States to take appropriate measures to address the additional barriers that prevent policies reaching specific target groups such as low-income households. Member States could also be required to specifically list the (financial) measures addressing these barriers and to monitor the effectiveness of these specific measures (Article 10.2 and 10.3).
- In order to specifically **address the split-incentives barrier** (landlord-tenant dilemma), the **EPBD** could suggest MS to include **limits to rental rates** and rental increases for all buildings with an **energy label below a certain threshold** that is raised over time[36] (e.g. class C until 2020, which is revised as soon as the target percentage of houses reach that class). In the UK and France, a measure was already announced in 2012 that buildings with F and G labels can no longer be rented from 2018.
- The future recast of the **EED** could **specifically address informational barriers.** Art. 10 of the **EED** (billing information) could require energy suppliers to include information about specific energy efficiency options in end users' energy bills and the payback periods of investments in such options. The EED could also ask Member States to actively communicate advanced energy efficiency improvements that can be achieved as well as their benefits (in terms of health improvement etc.). This information could be communicated widely to other stakeholders that may **provide target groups with access to capital** for implementing energy efficiency improvements (such as health insurance companies, banks and social security providers), who could then support taking up the recommended measures in relation to the benefits addressed (e.g. a mortgage company seeing the value of the property increase after investing in insulation). The implementation of this recommendation at Member State level could greatly enhance the effectiveness of information campaigns and energy audits[37].
- Article 20 (information) of the **EPBD** could be strengthened by requiring Member States to ensure that the opportunities and benefits of energy efficiency

[36] The housing association Bo-Ex in Utrecht (the Netherlands) has implemented a private initiative to renovate post-World War II houses from E/F/G label to A or B label without raising the rent to tenants (see Box 3).

[37] Good examples in section 4.7.2 and 4.7.3

improvements in households, specifically low-income households, are included in their **information campaigns** and awareness raising efforts.

- Article 3 of the **Labelling Directive** could be extended with a requirement for Member States to report on the extent to which end-users of appliances are reached and to what extent the information on the energy efficiency of appliances and products has influenced their purchase and use.

## 5.5. Two policy approaches to choose from by Member States

**Recommendation 5: Energy efficiency policies specifically addressing low-income households could be more effective in eradicating or reducing energy poverty than using only social policies. The choice of targeted policies is best left to the Member States.**

Our analysis showed that both social policies and energy efficiency policies addressing low-income households are suitable instruments to combat energy poverty. But they do it by addressing different causes. Whereas social policies address household income, energy efficiency policies targeting specifically low-income households address more relevant root causes, namely poor energy efficiency of dwellings and the consequent higher costs of the energy services for a household. Energy efficiency policies addressing low-income households is the only type of policy that can remove barriers to energy efficiency affecting low-income households. The most relevant barriers to energy efficiency in low-income households are the lack of information, poor access to finance, and the split-incentives barrier, Using energy efficiency policies as the core approach to combat energy poverty, brings multiple benefits to households (see chapter 2), including environmental, economic and important social impacts. These additional multiple benefits are of particular importance for low-income households. There are large differences among Member States concerning the extent to which low-income households are insufficiently reached by energy efficiency policies and the existence of additional barriers for this group. The influencing factors include differences in national social security systems (see section 4.5), for instance whether energy costs are paid by the social security system (such as in Germany or Sweden) or not (such as in the UK). Another key factor is the share of rented and owned accommodation in the group of low-income households (see Figure 5). The ownership rate is relatively low, for example, in Germany and Sweden, and relatively high in some of the newer Member States such as Hungary, Bulgaria and the Baltic States. Such differences have to be taken into account when designing specific policies for this target group and consequently it is recommended that this is left to the respective Member State. EU regulation can request Member States to define such policies where needed. It should also be recommended that specific measures to address energy poverty should be implemented at the level of local or regional governments since they are closer to the energy consumers.

*Specific suggestions*

- **Member States** are recommended to implement **structural programmes**[38] to improve energy efficiency in low-income households with a long term focus on reducing energy poverty**.** The European Commission is recommended to request Member States to do so in various Directives related to energy efficiency.
- Energy audits combined with financial instruments consisting of subsidies, loans and grants for building renovations are found to be the most effective measures to promote energy efficiency in low-income households. It is recommended that Member States adapt good practices such as the Caritas Stromspar-check programme. Success factors of this combination is the offer of free advice by well-trained advisors (sensitive to the needs of low-income households), and that improvements implemented are comprehensive, giving priority to weatherisation over appliance replacements (see section 4.4.1).
- Specific measures to address the uptake of energy efficiency in low-income households should be implemented at the level of **local or regional governments**.

## 5.6. Financing policies

**Recommendation 6: It is recommended that Member States use infrastructure funds from other sectors benefiting from positive impacts of energy efficiency (for example health and social welfare funds)and tie their energy efficiency policies to European social funds or investment funds to enhance policy implementation in low-income households.**

The successful implementation of energy efficiency policies hinges on access to funding for energy efficiency improvements. The additional benefits of energy efficiency other than energy savings may provide an important source of funding. For example, increased energy efficiency may avoid investments in infrastructure. Analysis in section 4.1.5 and experts interviewed (see list in Annex 1) lead to recommend that European Structural and Investment Funds could be used more extensively to support energy efficiency investments. Another alternative source of funding could be the revenues from sales of carbon allowances or credits, as improved energy efficiency results in avoided carbon emissions.

Credit lines from national or regional financial institutions or other public sector banks could also provide financing support. Where needed, a share of such additional funds could be ring-fenced for low-income households based on the argument that the highest benefits are obtained here, e.g. due to improved health and well-being. New financing models for energy efficiency measures can also be developed. This issue has already been addressed by various financial institutions, such as the European Mortgage Federation (EMF) that has defined mortgages at low-interest rates in order to scale up renovation. Another interesting example is the social model developed by the Global Environmental Social Business (GESB) in Hungary that sets up an independent entity between homeowners and banks that takes over part of the security of the bank to finance energy efficiency investments.

The European Commission and Member States can also further support standardisation of procedures, standards and contracts for energy efficiency and building renovations to support

[38] Good examples of such programmes are found among the international experiences (see section 4.7.3): In the USA 'Weatherisation Assistance Program' (WAP), in which eligible low-income households are offered a free energy audit and the most cost-effective measures are implemented free of charge. In New Zealand, the 'Warm Up New Zealand: Healthy Homes' programme focus on funding insulation for rental properties occupied by low-income tenants. Landlords are granted up to 50 percent of the retrofit cost and tenants get the full costs compensated.

investors and financial institutions to gain confidence in the market. This is for example done by the European Investor Confidence Project.[39]

Finally, European Structural and Investment Funds could be used to address the financial barriers to the uptake of energy efficiency measures for low-income households. This for example includes funds with a social aim such as the European Social Fund, the European Regional Development Fund and the Cohesion Fund, as these among others aim to improve the situation of the most vulnerable people at risk of poverty and/or strengthen economic and social cohesion in the European Union. These funds have already provisions for investments in social and health infrastructure but their uptake by the Member States could be improved. Such funds can be used to support energy efficiency measures that affect the quality of the housing stock and therewith the quality of life. Also the European Fund for Strategic Investments could be used to address specific market gaps such as providing initial investment for cost-effective energy efficiency improvements in social housing or private houses owned by very low-income households, and by mobilising private investments for renovation projects.

*Specific suggestions*

- The preamble of the **EED** and the **EPBD** should inform Member States about the multiple benefits of improved energy efficiency and suggest the use of funds related to these additional benefits as a potential alternative (or additional) source of funding. Examples of good practices at **Member State** level using funds related to additional benefits exist already and could be developed further. The French programme 'Habiter Mieux' finances overall dwelling improvements that prove benefits beyond energy efficiency, such as health and safety measures to make the handicapped and elderly more independent (see section 4.7.3).
- In addition, Article 20 of the **EED** (on funds, financing and technical support) could be strengthened by explicitly mentioning the use of funds related to the multiple benefits of energy efficiency, further encouraging Member States to use such funds, or, if deemed necessary, obliging Member States to use such funds in case the barriers are too persistent and reporting on implementation reveals that low-income households are insufficiently reached by the existing national policy framework.
- **Member States** could support use of credit lines from financial institutions to support renovation of social houses or private houses of low-income households. In addition, Member States could support the development of innovative financing mechanism such as on-bill repayment to help low-income households overcome the investment barrier.
- Finally, energy efficiency policies at **Member State** level could be tied to European social funds or investment funds to address specific local, regional or national barriers for low-income households. The **European Commission** is recommended to continue strengthening the streamlining and blending of the use of European Funds and supporting the linking of these funds to national energy efficiency programs and building renovation strategies. Member States in turn could pay more attention to the opportunities provided by the **European social funds or investments funds** to address the financial barriers to the uptake of energy efficiency measures for low-income households.

[39] See http://europe.eeperformance.org/

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# ANNEXES

## Annex 1: Overview of interviews

**Table 13 Overview of interviews**

| Organization/Country | Name of Stakeholder and position | Main topics discussed |
|---|---|---|
| **Bo-Ex - Housing Association of Utrecht** The Netherlands | Rolf van der Weide - Financial manager | Bo-Ex experience in renovating old households without increasing rent |
| **Caritas** Germany | Jürgen Schäferbarthold - Project Director Marlene Potthoff - Federal Program Coordination | Caritas appliance replacement program |
| **CONUEE - National Energy Efficiency Commission** Mexico | Pedro Hernandez - Director of planning of energy efficiency policies | Targeted energy efficiency programs as a replacement of non-discriminatory subsidies |
| **CURE - Centre for Urban Resilience and Energy, University of Manchester** United Kingdom | Stefan Bouzarovski – Professor and Researcher | Barriers and best practices in the United Kingdom and in Eastern Europe |
| **Energieheld** Germany | Pascal Ludynia- Former CEO and founder | Barriers to efficiency in thermal renovation. |
| **Euroace** Belgium | Adrian M Joyce - Secretary General and Campaign Director | Policy options to address low-income households |
| **ICAEN Institut Català de l'Energia** Spain | David Villar - Officer | Financial barriers to retrofit of buildings and household appliances |
| **KfW-Bank** Germany | Ralf Preußner – Program coordination | Loans, grants and financing for household´s refurbishment |
| **Municipality of Rubí, Catalonia** Spain | Marta Morera – Technical Supervisor Brilla project | Overcoming informational and financial barriers in Southern Europe |
| **Municipality of Utrecht** The Netherlands | Jan Schouw - Sustainability Concept and Business Developer | Financing of energy efficiency measures in social housing |
| **Policy Advisor** United Kingdom | Fiona Hall - Former Member of the EU Parliament | Policy options to address low-income households, best practices from UK |
| **Volgroen** The Netherlands | Emiel van Sambeek – Partner and Advisor | Barriers and access to finance for energy efficiency projects |
| **WSP** Sweden | Agneta Persson-Senior Policy Advisor | Energy poverty, Energy Efficiency and Social Security Systems in Sweden |

**Source:** Authors.

## Annex 2: Barriers to energy efficiency in the residential sector

**Table 14 Barriers to energy efficiency in the residential sector**

| Type | Sub-type | Nº | Barrier | Market failure (reason) | Relevance for low-income segment |
|---|---|---|---|---|---|
| Behavioural | Regarding priority | 1 | No general awareness of benefits of energy efficiency measures | Yes | High |
| | | 2 | Preference for visible (or other) improvements to the dwelling | No | |
| | Regarding comfort | 3 | Behavioural inertia and bounded rationality | Yes | |
| | | 4 | Comfort loss and dissatisfaction during refurbishment phase (noise, dirt, etc.) | No | |
| | | 5 | Concerns about dispute with tenant/landlord (behavioural dimension of split incentives problem) | No | |
| Informational | Dwelling information | 6 | No knowledge about energy consumption of the dwelling | Yes | High |
| | | 7 | Misperception about known consumption / lack of knowledge about saving potentials | Yes | High |
| | | 8 | No understanding of the difference between general maintenance costs (i.e. of boiler) and energetic improvements due to new investments | Yes | High |
| | External information | 9 | Lack of general information related to energy consumption, energy saving potentials, economic and environmental benefits, etc. | Yes | |
| | | 10 | Lack of credible information | Yes | |
| | | 11 | Lack of understandable information (complexity of information, form of information) | Yes | High |
| | | 12 | Lack of person-specific information due to heterogeneity of individual benefits | Yes | High |
| | | 13 | Lack of specific information about support programmes providing loans/grants | Yes | High |
| | | 14 | Lack of information about consultancy and advisory services | Yes | High |
| Economic | Financial | 15 | Lack of access to internal capital (i.e. lack of equity due to low savings or prioritisation of other investments) | No | High |
| | | 16 | Lack of access to external capital | No | High |
| | I n | 17 | Split incentives | Yes | High |

| Type | Sub-type | Nº | Barrier | Market failure (reason) | Relevance for low-income segment |
|---|---|---|---|---|---|
| | | 18 | Subsidies on energy prices | Yes | High (welfare system payments[40]) |
| | Risk aversion | 19 | Due to hidden costs (decision-related costs, information-related costs, new technology adaptation costs, etc.) | No | |
| | | 20 | Due to long amortisation time | No | High |
| | | 21 | Due to uncertainty about own future economic situation | No | High |
| | | 22 | Due to overall economic situation | No | |
| | | 23 | Due to uncertainty about energy prices | No | |
| | | 24 | Due to general preference for equity over debt | Yes | High |
| | | 25 | Due to technological risk | No | |
| Regulatory/ Administrative | Regulatory/ Administrative | 26 | Regulations to pass-through refurbishment costs to tenants | No | |
| | | 27 | Complex owner structures in multi-family housing | Yes | |

**Source:** Compiled from (Sorell et al, 2000), (Thollander et al, 2010), (IEA, 2012), (Fraunhofer ISE et al, 2012).

[40] Analysed in more depth in section 5.4 as well as in Table 21 (Annex 3)

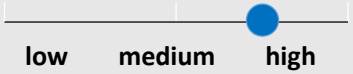
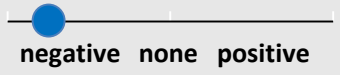
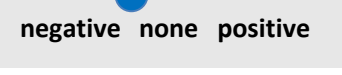
## Annex 3: Impacts of general energy efficiency policies for households

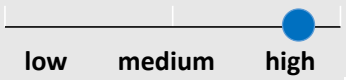
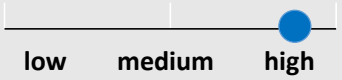
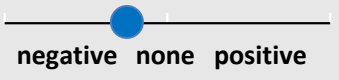
Table 15 presents an overview of the environmental, economic and social impacts on households resulting from the implementation of all general efficiency policies included in the MURE database. These impacts are rated on a scale from low, medium and high for environmental and economic impacts, and negative, none and positive for social impacts. Ratings for environmental impacts are taken from the MURE database[41]. Economic and social impacts are rated by experienced energy policy experts with the aid of the "*Successful policy facility*"[42] of the MURE database.

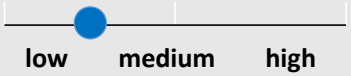
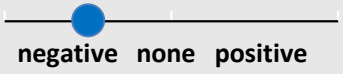
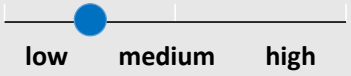
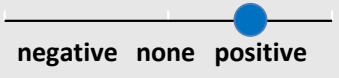
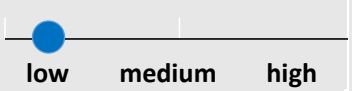
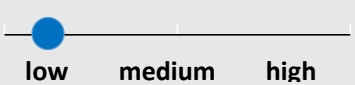
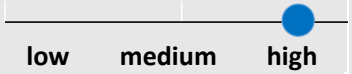
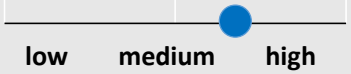
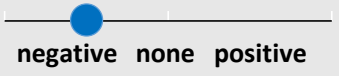
[41] These ratings were assessed by national experts based on weighted impact evaluations in proportion to the country's final energy consumption.

[42] Energy efficiency policies are rated in this facility in certain categories by national experts. For more information see http://www.measures-odyssee-mure.eu.

**Table 15 Overview of impacts of general energy efficiency policies for households in the EU-28 plus Norway**

| Instrument | Policy topic | EU MS | Environmental | Economic | Social |
|---|---|---|---|---|---|
| Financial / Information | Energy audits | BE, CZ, EE, FI, FR, DE, EL, LV, LU, MT, NL, NO, ES |  |  |  |
| Financial | Incentives promoting renewables | AT, BE, BG, HR, CY, CZ, DK, FI, FR, DE, EL, HU, IE, IT, LV, LT, LU, MT, NL, NO, PL, PT, RO, SI, ES, SE |  |  |  |
| Financial | Incentives for energy efficient building renovations | AT, BE, BG, HR, CZ, EE, FI, FR, DE, EL, HU, IE, IT, LV, LT, LU, MT, NL, NO, PL, RO, SK, SI, ES, SE, UK |  |  |  |
| Financial | Investments in new buildings exceeding building regulation | AT, BE, HR, CZ, FR, DE, IE, LV, LU, NL, NO, PL, SI, ES, SE, UK |  |  |  |
| Fiscal | Income tax credit/reduction | BE, EE, FI, FR, IT, SE |  |  |  |

| Instrument | Policy topic | EU MS | Environmental | Economic | Social |
|---|---|---|---|---|---|
| Legislative / Informative | Mandatory energy efficiency certificates for buildings | AT, BE, BG, HR, CY, CZ, EE, FI, FR, DE, EL, HU, IE, IT, LV, LU, NL, NO, PL, PT, RO, SK, ES, SE, UK |  |  |  |
| Legislative | Energy Performance Standards (Buildings) | AT, BE, BG, HR, CY, CZ, DK, EE, FI, FR, DE, EL, HU, IE, IT, LV, LT, LU, MT, NO, NL, NO, PL, PT, RO, SK, SI, ES, SE, UK |  |  |  |
| Information/ Education Legislative | Energy Labelling of Household Appliances | HR, EE, EU, FR, DE, EL, IE, LT, NL, SI, UK |  |  |  |
| Legislative | Energy Performance Standards (Appliances) | AT, BE, BG, HR, CY, CZ, DK, EE, FI, FR, DE, EL, HU, IE, IT, LV, LT, LU, MT, NO, NL, NO, PL, PT, RO, SK, SI, ES, SE, UK |  |  |  |

| Instrument | Policy topic | EU MS | Environmental | Economic | Social |
|---|---|---|---|---|---|
| Legislative/ Informative/ Education, | Smart metering and detailed energy billing | AT, DE, IE, LV, NL, UK |  |  |  |
| Informative/ Education | Information campaigns and information centres | AT, BE, CY, CZ, DK, EE, EU, FI, FR, DE, EL, HU, IE, LV, MT, NL, NO, PT, SK, ES, SE, UK |  |  |  |
| Informative/ Education | Voluntary labelling of buildings/ components (existent & new) | AT, BE, CZ, DK, FI, FR, DE, IT, NO, SE, UK |  |  |  |
| Market-based | Energy Efficiency Obligations | AT, BE, BG, DK, EE, ES, FR, IE, IT, MT, LT, LU, PL, SI, UK |  |  |  |

**Source:** Compiled by authors from (MURE database, 2016).

## Annex 4: Social policies addressing energy consumption in low-income households

### Table 15 Housing and heating allowances provided by the social security systems throughout the EU

| Member State | XI: GUARANTEED MINIMUM RESOURCES<br>Housing and heating allowances |
|---|---|
| Austria | The minimum standards (Mindeststandards) include a 25% share of housing costs. If the actual housing costs exceed the 25%-share of housing costs, additional benefits (e.g. housing or rent allowance) can be granted. |
| Belgium | Subsidies for installation, moving house and rent exist at regional level (federated entities). Entitlement to a heating allowance granted by the Public Centres for Social Assistance (Centre public d'action sociale/Openbaar Centrum voor Maatschappelijk Welzijn) in the framework of the Fuel Social Fund (Fonds social mazout/Sociaal Stookoliefonds) (Programme-Act of 22 December 2008 and Royal Decree of 27/3/2009).<br>The allowance, of a maximum amount of €300 per year, is provided to persons who belong to the following categories:<br><br>* 1st category: the beneficiaries of the increased reimbursement system (bénéficiaires de l'intervention majorée, BIM/rechthebbenden op de verhoogde verzekeringstegemoetkoming, RVV) of the sickness and invalidity insurance whose household income does not exceed the income limits for the 2nd category;<br>* 2nd category: low-income households whose annual gross taxable income does not exceed €17,303.80, increased by €3,203.14 for each dependent person;<br>* 3rd category: persons benefiting from a collective settlement of debts or a debt mediation and in respect of whom the Public Centre for Social Assistance has established that they are unable to cope with their heating bills. |
| Bulgaria | Persons and families whose income is lower than the differentiated minimum income for heating have the right to targeted heating allowance (целева помощ за отопление). The differentiated minimum income for heating is determined as a percentage of the guaranteed minimum income (Гарантиран минимален доход) and varies from 167.08% to 311.08% according to the category of persons in the same way as the differentiated minimum income for monthly social assistance allowances (Месечни социални помощи) (see "Cash benefits", "Determining factors") except that the percentages involved for heating are slightly higher.<br>The differentiated minimum income for heating is another category of income, giving rise to heating allowances. It has been set in different amounts per different categories and groups of persons, basically differentiated according to their family status.<br>If a person meets the requirements of more than one of the groups mentioned above, s/he is entitled to the most favourable percentage.<br>Housing:<br>Persons whose income for the preceding month is less than 250% of the differentiated minimum income (See "Cash benefits", "Determining factors") have a right to targeted monthly allowance for payment of rents for municipality lodgings. The allowance is granted to the following categories of persons:<br><br>* orphans up to the age of 25;<br>* lone elderly people over the age of 70;<br>* single parents. |

| Member State | XI: GUARANTEED MINIMUM RESOURCES<br>Housing and heating allowances |
|---|---|
| Croatia | Housing benefits (Naknada za podmirenje troškova stanovanja) include the cost of rent, electricity, gas, heating, water, water drainage and other housing costs. Accommodation costs are compensated by local governments or the City of Zagreb, for up to 50% of the monthly amount of the Guaranteed minimum benefit (Zajamčena minimalna naknada) to which the individual or household is entitled.<br>Recipients of Guaranteed minimum benefit who use wood for heating are entitled to Fuel allowance (Troškovi ogrjeva) consisting of 3 cubic metres of firewood once a year or a financial amount determined by the competent regional government.<br>Beneficiaries of guaranteed minimum benefit and of personal disability allowance are entitled to the Benefit for energy buyers at risk (Naknada za ugroženog kupca energenata). The monthly amount of the benefit is determined by Government Regulation and is up to maximum HRK 200 (€ 26).<br>These benefits can be renewed and are unlimited in time. |
| Cyprus | Social Insurance Services(Υπηρεσίες Κοινωνικών Ασφαλίσεων) (Social Pension (Κοινωνική Σύνταξη):<br>Not applicable.<br>Welfare Benefits Administration Service (Υπηρεσία Διαχείρισης Επιδομάτων Πρόνοιας):<br>Guaranteed Minimum Income (Ελάχιστο Εγγυημένο Εισόδημα)<br><br>* Up to €280 of Allowance for rent(Επίδομα Ενοικίου) or for Allowance for mortgage interest (Χορήγημα για Τόκους Στεγαστικού Δανείου) plus<br>* €70 for each disabled person,<br>* €56 for every 2 minor children or for every adult child in case of family units with more than 3 children. Scheme supporting pensioners' households with low income (Σχέδιο ενίσχυσης νοικοκυριών συνταξιούχων με χαμηλά εισοδήματα).<br>Not applicable. |
| Czech Republic | Housing Allowance (Příspěvek na bydlení) is paid to an owner or a tenant of a flat who is registered as a permanent resident, provided that 30% (in Prague 35%) of the family (household) income is not sufficient to cover housing costs and at the same time this 30% or 35% of family (household) income is lower than relevant normative housing costs given by law and differentiated according to type of housing (rental, cooperative, owner occupied flat), size of municipality and number of family members.<br>The amount of the Housing Allowance for a calendar month is calculated as the difference between the normative housing costs and the family's decisive income multiplied by a coefficient of 0.30 (in Prague 0.35).<br>Supplement for Housing (Doplatek na bydlení): see above "Basic Principles" and "Cash benefits, 2. Amounts". |
| Denmark | Individual Housing benefit (individuel boligstøtte) is granted after an objective calculation based on the housing expenditure, the income of the household, the area of the dwelling and the composition of the household, including the presence of children (Consolidated Act No 158 of 18 February 2015 on individual Housing Benefits, om individuel boligstøtte). |

| Member State | XI: GUARANTEED MINIMUM RESOURCES<br>Housing and heating allowances |
|---|---|
| Estonia | Subsistence benefit (toimetulekutoetus):<br>No separate allowances. Upon determination of the entitlement to and amount of benefit, the following housing expenses are taken into account within established limits:<br><br>* rent;<br>* the cost of services of supplying water and leading off waste water;<br>* the cost of energy for heating and supply of hot water;<br>* the costs related to consumption of electricity;<br>* the cost of household gas;<br>* land tax, ;<br>* building insurance;<br>* the municipal waste fee.<br>* in case of an apartment building the administration costs and repayment of loan taken for renovation of the apartment building Needs-based family benefit (vajaduspõhine peretoetus) and Unemployment allowance (töötutoetus):<br>No separate allowances. |
| Finland | There are separate statutory housing allowances.<br>Housing costs are taken into consideration in determining the amount of the housing allowance. |
| France | Means-tested housing allowances granted to tenants and home-buyers in order to reduce their housing charges. The amount depends among other things on the resources, the family situation, the place of residence, the rent and the number of children or dependent persons. |
| Germany | Assistance towards living expenses (Hilfe zum Lebensunterhalt) / Needs-based pension supplement in old age and in the event of reduced earning capacity (Grundsicherung im Alter und bei Erwerbsminderung):<br>Costs for adequate housing and heating are covered, provided that they are reasonable.<br>Basic security benefits for jobseekers (Grundsicherung im Alter und bei Erwerbsminderung):<br>Actual housing and heating costs are covered to the full amount if these are reasonable. The reasonable character is generally based on the local conditions. |
| Greece | Housing allowance (ΣΤΕΓΑΣΤΙΚΗ ΣΥΝΔΡΟΜΗ):<br>Non-contributory benefit in the form of a rental fee, paid to uninsured and financially weak elderly over 65 years who live alone or in a couple and do not own a house. The programme is implemented by the Directorate of Social Welfare of the municipalities of the country. The Housing Allowance amounts to €362 per month. |
| Hungary | Legislation concerning home maintenance support was repealed from 1 March 2015. Local governments can provide financial aid to support housing costs in the form of the local benefit (települési támogatás).<br>Home maintenance support on a normative basis has been provided until 30 December 2015. From 1st January 2016, it can only be provided in the framework of debt management service. |

| Member State | XI: GUARANTEED MINIMUM RESOURCES<br>Housing and heating allowances |
|---|---|
| Ireland | Rent Supplement:<br>The rent supplement scheme provides short-term support to eligible people living in private rented accommodation, whose means are insufficient to meet their accommodation costs and who do not have accommodation available to them from another source.<br>The level of support varies depending on location of the rented accommodation and family size. In the case of a couple with two children with no means other than a minimum non-contributory payment, a supplement is payable, whose amount varies depending on the location. The couple pays the first €173 of the rent and a supplement for the balance is paid.<br>Fuel Allowance:<br>Recipients of Supplementary Welfare Allowance, Jobseeker's Allowance (long-term), Disability Allowance, One Parent Family Payment, Blind Pension, Farm Assist, Widow's, Widower's or Surviving Civil Partner's (Non-Contributory) Pension and State Pension (Non-Contributory) may also qualify for a Fuel Allowance of €22.50 per week which is payable for 26 weeks per annum. |
| Italy | The regulations vary according the regions and municipalities. |
| Latvia | The autonomous functions of local governments include provision of assistance to residents in resolving housing-related issues. Local municipalities are responsible for providing housing benefit to ensure material support for families or separately living persons with low income to pay rent and public utilities. According to the relevant legislation, a housing benefit is the second mandatory benefit that shall be paid to a person or a family of the relevant local municipality. Housing benefit is paid from the municipal budget.<br>The amount and award principles of this benefit vary from one municipality to another depending on the available resources.<br>The income level at which the household is entitled to the household allowance ranges from €128 to €360 per person. Some municipalities grant a housing allowance once a year, others calculated it on a monthly basis.<br>If the person is granted the status of a needy person and she/he has expressed a wish to be a tenant of a social flat (housing), the person can rent a flat as social housing where reduced rent and utility payments are charged. |
| Lithuania | Reimbursement for Cost of House Heating, Hot Water and Drinking Water (Būsto šildymo išlaidų, geriamojo vandens ir karšto vandens išlaidų kompensacijos):<br>Provided for poor families and based upon a means test. A family should not have to pay more than 20% of the family income above the State Supported Income (valstybės remiamos pajamos), i.e. €102 per family member for heating of a standard size of accommodation; 5% of the family income for basic standard of hot water; 2% of the family income for basic standard of drinking water.<br>Standard size of accommodation:<br><br>* 50 m2 for a single resident;<br>* 38 m2 for the first family member;<br>* 12 m2 for the second family member;<br>* 10 m2 for the third and any additional family member. Standard size of drinking water, when the central heating system is used to heat water:<br><br>* 2 m3 for the first family member and a single resident;<br>* 1.5 m3 for the second family member;<br>* 1 m3 for the third and any additional family member. Standard size of drinking water, when other types of energy or fuel are used to heat water:<br><br>* 3.5 m3 for the first family member and a single resident; |

| | |
|---|---|
| | * 2.5 m3 for the second family member;<br>* 1.5 m3 for the third and any additional family member. Standard size of hot water:<br><br>* 1.5 m3 for the first family member and a single resident;<br>* 1 m3 for the second family member;<br>* 0.5 m3 for the third and any additional family member. The municipal administration has the right to deny the granting of Reimbursement for the Cost of House Heating (Būsto šildymo išlaidų kompensacija) to persons who own a dwelling in a multi-dwelling building and who were granted or who have the right to the Reimbursement for the Cost of House Heating and who failed to participate in the meeting where the decision on the implementation of the renovation (modernisation) project of the building was considered and made, and because of that the process of the renovation (modernisation) of the building has not started.<br>Families or single residents who own a dwelling in a multi-dwelling building are entitled to support towards the cost of a loan taken out to finance the renovation of the building, provided they participate in the modernisation project and they are entitled to the compensation for heating expenses.<br>For the definition of family see above "Basic principles". |
| Luxembourg | Where rent is due for an occupied flat the difference between the rent paid and the amount corresponding to 10% of the guaranteed minimum income (revenu minimum garanti) is granted in addition. Maximum €123.94. |
| Malta | An Energy Benefit (Beneficcju ta' l-Energija) to alleviate water and electricity bills is paid:<br><br>* To the head of household who is in receipt of one of the following non-contributory social benefits:<br>* any Social Assistance (including Unemployment Assistance);<br>* The Special Unemployment Benefit;<br>* Non-Contributory Age Pension;<br>* Carers' Pension.<br>* To the head of household who is in receipt of the Supplementary Allowance or Children's Allowance, as long as the means of the family, as calculated in order to qualify for such Supplementary Allowance or Children's' Allowance, as is the case, does not exceed the amount of €8,886;<br>* This assistance is also awarded to the head of household who is in receipt of any Disability Pension or a Pension for the Visually Impaired, unless the means of the family per year, do not exceed the amount of €8,886;<br>* This assistance will also be awarded on humanitarian grounds, to any head of household who proves to the satisfaction of the Director that:<br>* any member of the family has a medical condition that requires the excessive use of water and electricity; and<br>* the members of the family are permanently residing in Malta; and<br>* the household income, is less than €30,910.30 per year.<br>Furthermore, recipients of social assistance (Ghajnuna Socjali) who pay rent for their place of residence are entitled to a rent allowance of €1.16 per week. A subsidy on telephone bill of €0.84 per week is also paid to persons over 60 years of age. |
| Poland | No special housing and heating allowances but a person or a family can receive Special Needs Allowance (Zasiłek specjalny/celowy) for housing or heating costs. The amount depends on the decision of the Social Assistance Centres. |
| Portugal | No housing and heating allowances. |
| | |

| Member State | XI: GUARANTEED MINIMUM RESOURCES<br>Housing and heating allowances |
|---|---|
| Romania | The Heating Energy Allowance (ajutor pentru energia termica):<br><br>* Main condition: monthly average net income per family member or monthly net income of an individual within the legal limits;<br>* Amount: the general amount financed from the State Budget varies between 90% of the heating invoice for a family with a monthly average net income per family member lower than 0.3100*RSI and 5% of the heating invoice for a family with a monthly average net income per family member between 1.2302*RSI and 1.5720*RSI. The general amount is increased with 10% for an individual. Individuals with a monthly net income between 1.5722*RSI and 2.1640*RSI receive compensation of 10%.<br>* The maximum general amount financed from the local budgets varies between 7% for individuals and families with a monthly average net income per family member lower than 0.3100*RSI and 63% for individuals with a monthly net income between 1.5722*RSI and 2.1640*RSI. However, there is a special amount of 100% for an individual or family entitled to Social Aid (ajutor social).Natural Gas Allowance (ajutor pentru gaze naturale):<br><br>* Main condition: monthly average net income per family member or monthly net income of an individual within the legal limits;<br>* Amount: the general amount varies between 0.5240*RSI for a family with a monthly average net income per family member lower than 0.3100*RSI and 0.0400*RSI for a family with a monthly average net income per family member between 1.0802*RSI and 1.2300*RSI. The general amount is similar for an individual. Solid Fuel or Oil Allowance (ajutor pentru combustibili solizi sau petrolieri):<br><br>* Main condition: monthly average net income per family member or monthly net income of an individual within the legal limits;<br>* Amount: the general amount varies between 0.1080*RSI for a family with a monthly average net income per family member lower than 0.3100*RSI and 0.032*RSI for a family with a monthly average net income per family member between 1.0802*RSI and 1.2300*RSI. The general amount is similar for an individual. However, there is a special amount of 0.1160*RSI for an individual or family entitled to Social Aid. Electricity Allowance (ajutor pentru curent electric):<br><br>* Main condition: monthly average net income per family member or monthly net income of an individual within the legal limits;<br>* Amount: the general amount varies between 0.4800*RSI for a family with a monthly average net income per family member lower than 0.3100*RSI and 0.0960*RSI for a family with a monthly average net income per family member between 1.0802*RSI and 1.2300*RSI. The general amount is similar for an individual.RSI =Reference Social Indicator (indicator social de referinta) = RON500 (€110). |
| Slovakia | Housing Benefit (Príspevok na bývanie) is an integral part of the Assistance in Material Need (Pomohmotnej núdzi) (see above "Cash benefits, 2. Amounts"). |
| Slovenia | A tenant in non-profit housing, in committed rental housing to the level of non-profit rent or in a living unit intended for the temporary solution of the housing needs of persons at social risk, market rental housing and janitor´s apartment is entitled to Subsidised Rent (subvencija najemnine) if his/her income and the income of persons stated in the contract of lease does not exceed the level of their Minimum Income (minimalni dohodek)without the increase for work activity, increased by 30% of their established income and by the amount of non-profitable rent. |

| Member State | XI: GUARANTEED MINIMUM RESOURCES<br>Housing and heating allowances |
|---|---|
| Spain | Housing allowances amounting to €525 per year aimed at easing the cost of the rent when the beneficiary fulfils, among others, the following conditions:<br><br>* to be entitled to a non-contributory old-age or invalidity pension,<br>* to lack home ownership,<br>* not to be a relative on the third degree of the owner. No heating allowances. |
| Sweden | Costs for adequate housing are covered. |
| The Netherlands | Rent allowance (Huurtoeslag):<br>Whether a household or person is eligible for a rent allowance depends on their rent, income, assets, household type and age.<br>In particular, rent should not exceed:<br><br>* €710.68 per month for persons aged 23 or over;<br>* €409.92 per month for persons under 23 years of age. Moreover, taxable income should not exceed:<br><br>* €22,200 for a single person aged below or above the legal retirement age;<br>* €30,050 for a household whose highest earner is aged below the legal retirement age;<br>* €30,050 for a household whose highest earner is aged above the legal retirement age. The rent allowance is based on current rent levels and taxable income. The underlying principle is that every household pays a part of the rent itself. This part is referred to as the "standard rent". The standard rent is income-related and increases as the household taxable income becomes higher. The monthly standard rent for people with a minimum income equals:<br><br>* €228.24 for households with two or more people aged above the legal retirement age;<br>* €230.05 for a single person aged above the legal retirement age;<br>* €231.87 for households with people under the legal retirement age. The rent allowance amounts to the difference between the actual rent and the standard rent. For rents up to €409.92 the full differential amount is paid. For higher rents, only part of the difference is covered. |
| United Kingdom | Housing Benefit:<br>Means-tested, tax-financed social assistance scheme to help people in and out of work who are on a low income and who need help to meet their rent liability. Benefit paid through local authority (municipality).<br>Winter Fuel Payment:<br>An annual lump sum payment to people over the women's state pension age to help with their winter fuel bills. GBP 200 (€271) for those up to age 79, or up to GBP 300 (€407) if aged 80 or over.<br>Cold Weather Payment:<br>GBP 25 (€34) paid automatically to people receiving specified means-tested benefits when the average temperature where the claimant lives is recorded as, or forecast to be, 0º C or below over seven consecutive days during the period from 1 November to 31 March. |

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DIRECTORATE-GENERAL FOR INTERNAL POLICIES

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